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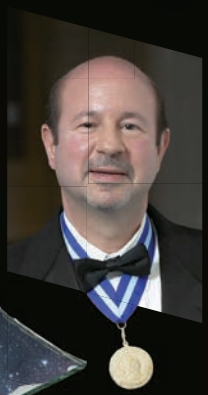
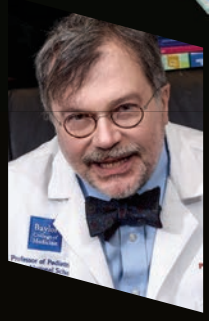
Skeptical Inquirer

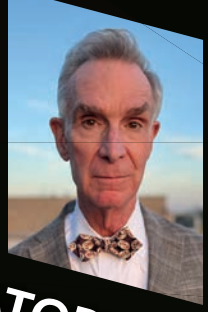
SINCE 1976 — THE MAGAZINE FOR SCIENCE AND REASON

Vol. 49, No. 5 | September/October 2025

THE DISTURBING ATTACKS ON SCIENCE







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The Skeptical Inquirer (ISSN 0194-6730) is published bimonthly by the Center for Inquiry in association with the Committee for Skeptical Inquiry, P.O. Box 703, Amherst, NY 14226. Printed in U.S.A. Periodicals postage paid at Buffalo, NY, and at additional mailing offices. Subscription prices: one year (six issues), $35; two years, $60; three years, $84; single issue, $5.99. Canadian and foreign orders: Payment in U.S. funds drawn on a U.S. bank must accompany orders; please add US$10 per year for shipping. Canadian and foreign customers are encouraged to use Visa or Master Card.

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[FROM THE EDITOR

Science Saves Lives, but Science Is under Attack

Science—due to the collective effort of an interdisciplinary community of scientists—saves lives. Yet science currently faces attack on multiple fronts by numerous players with dire consequences. Our cover for this issue of Skeptical Inquirer highlights "The Disturbing Attacks on Science" based on five articles authored by scientists and science communicators.

First—a few weeks prior to the book's release—we present an excerpt from the forthcoming *Science under Siege: How to Fight the Five Most Powerful Forces That Threaten Our World*, coauthored by two of the world's most influential scientists. Dr. Peter J. Hotez conducted vaccine research (with Maria Elena Bottazzi) that led to a Nobel Peace Prize nomination, and Michael E. Mann contributed to the climate crisis work (along with others from the Intergovernmental Panel on Climate Change) that resulted in a Nobel Peace Prize. Their book warns about five disturbing forces causing the world, and especially the United States under the Trump administration, to embrace anti-science—the most hazardous form of pseudoscience due to its promotion of false information coupled with the demonization science. The five disturbing forces (plutocrats, petrostates, professionals, propagandists, and the press) work together to negatively shape a wide range of scientific issues, including health, which is the focus of the excerpt from Mann and Hotez.

Next up, industry scientist Dan Wilson (who also hosts the YouTube channel *Debunk the Funk*) describes how budget cuts to the National Institutes of Health damage basic research, ultimately hurting people's health and costing people's lives. Then, epidemiologist Katie Suleta warns of the "brain drain" happening in the United States as the result of the new governmental policies hostile toward scientists. Science communicator Bill Nye then shares the transcript from his impassioned speech at the Stand Up for Science rally held on the steps of the Lincoln Memorial.

These authors provide grave warnings while also offering glimmers of hope due to the ways they are fighting back. More hope comes from the young science communicators who participated in the ScienceSaves campaign hosted by the Center for Inquiry with thanks to campaign founder Todd Stiefel and CFI Education Director Bertha Vazquez. In these pages, we share the transcripts of the winning videos from high school seniors (including Jacqueline Held, Annie Vo, Itai Hershko, and Kaun Kulamavalavan) whose stories help us celebrate the power of science.

—Stephen Hupp

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Our Values: Integrity, Courage, Innovation, Empathy, Learning, and Wonder.

News Bites: From the Use of Psychic Advisors to the Removal of Vaccine Advisors

Stephen Hupp and William Matthew London

Ten Percent of Americans Believe Psychics Offer Helpful Insights. On May 21, 2025, Pew Research released new survey results showing that 10 percent of Americans "consult a fortune teller, tarot cards, astrology, or a horoscope" and believe that these offerings provide "helpful insights." An additional 20 percent use these offerings but do so "just for fun." (For more, read "30% of Americans Consult Astrology, Tarot Cards or Fortune Tellers" at pewresearch.org.)

Adam Conover Apologizes for Promoting the Orb. On May 23, 2025, Adam Conover, host of the skeptical show *Adam Ruins Everything*, released an apologetic video saying: "I posted a sponsored video on Instagram and TikTok for a tech company called World and its product, the Orb. Now, if you're not familiar, this is just a comically creepy product … The Orb purports to scan your iris to prove that you're human, and in return for giving up that precious biometric data it gives you about forty bucks in crypto. This thing has already been banned in several countries, and even the rest of the crypto industry has called it out for being predatory. And you know I've devoted my entire career as a comedian to debunking scams, and I am on record as being extremely skeptical—even negative—about AI and crypto … I'm humiliated, to be quite honest. It feels like I was asleep at the wheel of my own life in some way." (For more, read "Adam Conover Apologizes for Becoming a 'Crypto Shill'" at avclub.com.)

Trump Reposts the Conspiracy Theory That Biden Is a Robotic Clone. On June 1, 2025, President Donald Trump used his social media platform to repost an outlandish and harmful conspiracy theory about former president Joe Biden. The post said (in part):

"There is no #JoeBiden—executed in 2020. #Biden clones doubles & robotic engineered soulless mindless entities are what you see." This action occurred less than two weeks after news broke that Biden was diagnosed with an aggressive form of prostate cancer. (For more, read "Trump Shares Post Saying Biden was Executed, Replaced with Clones" at foxnews.com.)

NAS President Calls for Rebuilding U.S. Leadership in Science. On June 3, 2025, during her second annual State of the Science address, National Academy of Sciences (NAS) President Marcia McNutt raised doubts about the United States remaining a research and development powerhouse. She called for rebuilding U.S. science leadership by: (1) building on our culture of innovation with an approach "based on evidence and expertise, not on opinion or ideology," (2) creating a national research strategy, (3) improving K–12 science education, (4) building the domestic STEM workforce, (5) reducing red tape on research, (6) expanding access to international resources, and (7) rebuilding public trust in science. (For more, read "NAS President Says U.S. Science Is Facing 'Pessimistic' Future, Urges Changes to Regain Leadership in Science" at nationalacademies.org.)

Federal Student Aid Office Attempts to Prevent Chatbot Fraud. On June 6, 2025, Federal Student Aid, an office of the U.S. Department of Education, announced a new effort to prevent financial aid fraud. This new effort is needed due to crime rings that use artificial intelligence to create "ghost students"—chatbots signing up and participating in online courses for the purpose of receiving financial aid. Additional screenings will be used to ensure applicants are genuine students. (For more, read "Significant Actions to Prevent Fraud through Identity Verification" at fsapartners.ed.gov.)

Robert F. Kennedy Jr. Fires All Seventeen Vaccine Advisors. On June 9, 2025, the U.S. health secretary fired the entire advisory committee on immunization practices (ACIP), the group that advises the Centers for Disease Control and Prevention about vaccines for children and adults. Kennedy is well known for spreading false and harmful health information, such as the long-debunked claim that vaccines cause autism. Soon after removing the well-qualified advisors, Kennedy began choosing new members that appear to be sympathetic to his anti-vaccination rhetoric. (For more, read "RFK Jr Scraps Vaccine Committee Members in Effort to Restore 'Public Trust' at foxnews.com.) ■

Stephen Hupp is the executive director of CSI and editor of Skeptical Inquirer.

William Matthew London is a professor of public health at Cal State LA and the editor of the free weekly email newsletter *Consumer Health Digest*.

PRESS RELEASE]

Barry Karr Announces Retirement, Stephen Hupp to Succeed Karr

Note: This press release was issued by CFI on May 14, 2025. Karr's last day was July 3.

After a storied career spanning more than four decades, one that began as a college kid stuffing envelopes and eventually led to a distinguished tenure as executive director of the Committee for Skeptical Inquiry (CSI), Barry Karr has announced his retirement.

Center for Inquiry (CFI) President and CEO Robyn Blumner praised Karr as "an institution." She added:

> There is no one alive today who has done more for the skeptical movement: in building it, expanding it, and giving it gravitas and international importance.
>
> As executive director of the Committee for Skeptical Inquiry, Barry has been the leader of a vitally important endeavor—to bring rigor, logic, critical thinking, and the processes of science to bear on claims of the supernatural, paranormal, and medical miracles. He is in many ways the backbone of our organization, and we will miss him profoundly.
>
> But I cannot imagine a better successor than Stephen Hupp, whose background in the promotion of critical thinking and evidence-based psychology is a perfect fit. Everyone who has worked with Stephen knows he is a big thinker, an accomplished leader, and the right person to guide the skeptical movement into the future.

Barry at CSICon 2011 in New Orleans. Credit: Brian Engler.

Hupp is the current editor of Skeptical Inquirer magazine, a role he officially assumed in June 2023. Hupp is a CSI fellow, licensed clinical psychologist, and professor of psychology. Before becoming editor, Hupp was a Skeptical Inquirer contributor and has published several books, including *Investigating Pop Psychology* (with Richard Wiseman). In addition to his myriad duties as CSI's executive director and SI editor, Hupp will continue in his role as a professor in the Department of Psychology at Southern Illinois University, Edwardsville.

"I've long perceived Barry to be at the heart of modern skepticism," said Hupp, "but it wasn't until I started working for him that I realized what a force of nature he has always been. He has amplified—and in many cases even discovered—most of the prominent skeptical voices we've heard from over the last four decades."

"I have been involved with CSI for so long. I saw it back when it was so small, and to see what it's grown into—and to have had a hand in building it … It's a tremendous feeling of accomplishment," Karr said. "I'm proud of where we've been, and I could not be more excited about where the organization is going. Stephen Hupp is a very qualified, very dynamic leader, and I cannot imagine anyone better to lead CSI going forward."■

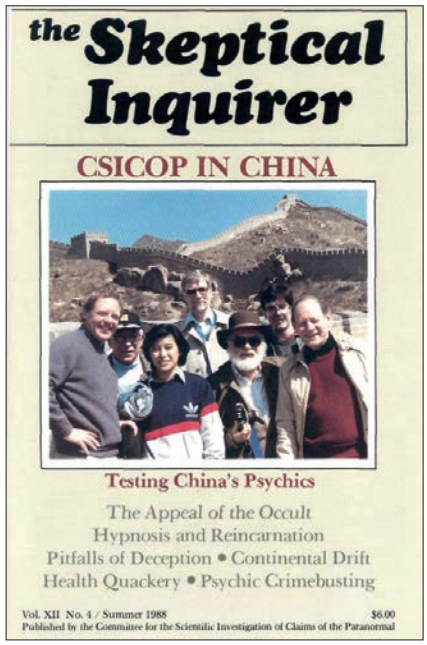
Barry Karr Strengthened the Skeptical Community by Bringing People Together

STEPHEN HUPP

The Committee for the Scientific Investigation of Claims of the Paranormal (CSICOP) started in 1976, thanks largely to the organizational and inspirational talents of Paul Kurtz. Five years later, one of Kurtz's greatest moves turned out to be his decision to hire Barry Karr, then a college sophomore, for a part-time position. Kurtz quickly promoted Karr to a full-time position as the assistant public relations director, and it didn't take long before Karr was running the show as the executive director and CFO, positions he held at CSI until his retirement in July.

In Karr's early career, he helped investigate claims made by the likes of Peter Popoff, and it's through these investigations that we really cut to the heart of what skepticism means for Karr. For example, Karr expressed disdain for Popoff, who chose to use his fake faith healing powers on Karr—who himself was faking an ailment—instead of on a nearby child with real life challenges. Fortunately, Popoff's star faded when James Randi finally exposed his deceitfulness. Karr's conclusion: "I have no words strong enough in my vocabulary to describe my feelings toward Peter Popoff." Karr offered the same conclusion about the fake paranormal spoon-bender Uri Geller, who sued CSICOP and Randi for calling out his methods of deception. Thanks to the efforts of people such as Karr, Kurtz, and Randi, Geller lost the lawsuit and even had to pay additional legal costs. It helps to have science, reason, and good lawyers on your side.

Karr also gained experience managing book tours for well-known skeptical authors in collaboration with Kurtz's Prometheus Books. He also learned how to throw a celebratory party in the form of a science conference. The first CSICOP meeting was held in 1983 in Buffalo, New York, subsequently followed by many more skeptical meetings across the United States and abroad. Consistent with the name change from CSICOP to CSI (Committee for Skeptical Inquiry), Karr organized the first CSICon in 2011 in New Orleans, and he's been the driving force behind every CSICon ever since.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Vol. XII No. 4 / Summer 1988
$6.00
Published by the Committee for the Scientific Investigation of Claims of the Paranormal

From left to right: Kendrick Frazier, Philip J. Klass, Wu Xiaoping, James Alcock, James Randi, Barry Karr, and Paul Kurtz. Photo by Ding Jian.

Across all these meetings, Karr rounded up the most notable names in skepticism while also raising the profile of so many more science communicators. Karr strengthened the skeptical community beyond measure by bringing people together. In addition to the formed friendships and professional partnerships, skeptical meetings provide a place for skeptics to learn from each other about what works—and what doesn't—when it comes to science communication.

Karr's legacy extends far beyond the specific work he accomplished for CSI. He was instrumental in bringing so many other skeptical thinkers into organized skepticism (including me). Even outside of CSI, he helped countless other skeptical organizations get their start, build their mission, and expand their reach. There's a real collaborative nature in the skeptical community, and much of this cooperative mindset begins with Karr.

In the 2001 book *Skeptical Odysseys* (edited by Kurtz), Karr's chapter recounts two of the greatest thrills from the first half of his career. The *second-greatest thrill* was being part of the first CSICOP trip to the People's Republic of China. The trip was documented in the Summer 1988 issue of Skeptical Inquirer with Karr on the cover right smack in the middle between Kurtz and Randi. On that note, the Skeptic's Toolbox—a workshop sponsored by CSI—even recognized Karr with the honorary In the Trenches award in 2012 by emphasizing that he "traveled the world helping to spread rational thinking."

The *first-greatest thrill*, according to Karr, was meeting his wife, Chris Karr, a graphic designer for SI. In the *Skeptical Odysseys* book chapter, Karr shares that they had recently celebrated the birth of their baby daughter. Today, they enjoy spending time with their two grandchildren, an acceptable reason to retire if ever there was one. ■

Stephen Hupp is the executive director of CSI and editor of Skeptical Inquirer.

Photo credit: Susan Gerbic (middle left, bottom left, top right), Tim Binga (middle), Brian Engler (bottom right), Karl Withakay (middle right)

Community Water Fluoridation Is One of the Greatest Public Health Triumphs

H. GRANT RITCHEY JR.

Imagine discovering a cheap, safe, and effective public health intervention that prevents the most prevalent disease in humans, saves billions in healthcare costs, reduces childhood suffering, improves school attendance, and even lowers visits to the emergency room. Then imagine some folks—fueled by ideas from nonmedical, anti-science people in power, dodgy YouTube videos, long-refuted conspiracy theories, and the irresistible allure of "doing their own research"—deciding that all this is somehow a bad idea. Welcome to the curious case of community water fluoridation in America, circa 2025.

Community water fluoridation, simply put, is one of the greatest public health triumphs of the past century. First implemented in Grand Rapids, Michigan, in 1945, fluoridation involves adjusting the level of fluoride in public drinking water to the optimal concentration of 0.7 parts per million (ppm), a sweet spot where cavity prevention is maximized while risk of side effects remains vanishingly small.

The science is robust. The Centers for Disease Control and Prevention (CDC) has repeatedly named fluoridation one of the top ten public health achievements of the twentieth century. Countless studies over decades show that people living in fluoridated communities experience significantly lower rates of tooth decay—by as much as 25 percent in children and adults alike. This is not just about kids' teeth, either. Dental decay is one of the most common chronic diseases in the world, and untreated cavities can lead to pain, infection, hospitalization, and—in rare cases—death.

So, why are we talking about a rollback?

The Return of the Rotten

Recently, states such as Florida and Utah have begun stripping fluoride from their water supplies. Why? Because Robert F. Kennedy Jr.—environmental lawyer, anti-vaccine crusader, and now the head of the Department of Health and Human Services—has taken up fluoridation as his latest science-bashing crusade. Despite lacking formal training in medicine, dentistry, toxicology, epidemiology, or public health, Kennedy speaks with the kind of unfounded confidence that only comes from deep ignorance.

Kennedy and his acolytes claim that fluoride is dangerous and a "neurotoxin" and that its presence in public water systems is tantamount to mass poisoning. That kind of language—stripped of nuance, evidence, or responsibility—plays well in social media echo chambers but causes real harm in the real world. The main assertion by anti-fluoridationists is that community water fluoridation causes a drop in IQ in those who consume it, a claim inferred from poorly designed studies; more on that shortly.

In Florida, Kennedy's influence led to a 2024 vote in Pinellas County to end fluoridation—despite protests from dental professionals, pediatricians, and public health experts. Utah followed suit, citing similar "concerns" rooted more in ideology than in data. And

now other municipalities are debating whether or not to end community water fluoridation.

But What about That Study?

If you've ever found yourself in the digital trenches with anti-fluoride advocates, chances are someone has triumphantly dropped a link to a recent study from *JAMA Pediatrics* (Taylor et al. 2025).

It purports to find a link between fluoride exposure and lower childhood IQ scores. Scary stuff—until you read it. Then read it again, slowly, and with statistical glasses on. What you'll discover is a flawed study design, weak effect sizes, and poor control of confounding variables.

It didn't take long for experts to respond. Check out the well-argued rebuttal in *JAMA Pediatrics* itself (Levy 2025) or a detailed, preprint critique from independent researchers (Jané et al. 2025). In essence, the much-hyped IQ scare lacks sufficient evidence to gain intellectual traction or inform policy. When the full body of literature is examined—as in multiple meta-analyses—the results continue to support the safety and effectiveness of fluoride at recommended levels.

Dollars and Cents(ibility)

Let's talk money—because removing fluoride from water doesn't just lead to toothaches; it leads to budget aches.

According to the CDC, every $1 invested in community water fluoridation saves $20 in dental treatment costs. That's a 2,000 percent return on investment. In large communities, the savings are even greater, as the costs to implement water treatment are shared among more inhabitants.

Eliminating fluoride doesn't reduce dental disease; it magnifies it. We're talking billions of dollars in added healthcare expenses, a spike in emergency room visits for dental pain and infection, missed work and school, higher Medicaid expenditures, and increased insurance payouts, leading to higher premiums. In 2016 alone, the United States spent $2 billion on emergency dental visits—many of which could have been avoided with better prevention strategies, such as community water fluoridation.

And guess who's most affected? Low-income families, children, the elderly—those who already struggle to access dental care. Removing fluoride from public water turns the faucet off on one of the few truly equitable (and most cost-effective) health interventions we have.

Still Not Poisoning Your Precious Bodily Fluids

The argument that fluoride is a mind-control chemical invented by the communists never really died; it just got rebranded as "natural health skepticism." But the science hasn't changed. Fluoride at 0.7 ppm is not toxic, not carcinogenic, and not associated with decreased IQ.

On the *Science-Based Medicine* blog, I and others have written about this extensively (Ritchey 2014; Ritchey 2015; Novella 2023; Novella 2024):

The pattern is clear: well-conducted science supports fluoridation. The fear-mongering is always based on cherry-picked data, fringe journals, or ecological studies with weak statistical power (e.g., using industrial fluoride polluted–water consumption as a proxy for community water fluoridation).

Let's be honest: every public health intervention carries some risk, but in the case of community water fluoridation, those risks are both minimal and well-documented. The benefits, on the other hand, are overwhelming. The most common side effect? Mild dental fluorosis, a cosmetic issue that doesn't harm health and is barely noticeable to anyone not doing a Zoom close-up.

The Road Ahead (with More Cavities?)

What's frustrating is that this isn't a battle of science versus science. It's science versus ideology. Science versus misinformation on the internet. Science versus TikTok pseudo-dentists and alternative wellness influencers who think your toothpaste is a government plot.

We shouldn't be arguing about fluoride in 2025. We should be talking about expanding access to community water fluoridation, improving dental equity, and funding more school-based oral health programs. Instead, we're fighting rear-guard actions in city councils and school boards, trying to stop a wave of regress fueled by ignorance, ideology, mistrust, and misinformation.

The good news? The science is still on our side. So is history. So are the dentists, pediatricians, epidemiologists, economists, and public health officials. What we need now is public advocacy, scientific literacy, and a renewed commitment to keeping evidence-based medicine in our taps.

Because without it, we're just setting ourselves up for a mouthful of trouble. Let's not Make Teeth Rotten Again. ■

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H. Grant Ritchey Jr., DDS, FAGD, is a general dentist in Kansas and occasional contributor to *Science-Based Medicine*. He was a former cohost of the science-based *Prism Podcast*. When not defending fluoride, Ritchey enjoys shaming people for not flossing and reminding the public that not all chemicals are bad and not all influencers are qualified.

Evolution and History in India

AMARDEO SARMA

Despite overwhelming evidence, the public debate about evolution and pseudoscientific narratives about human history continues. In addition to the well-known example of creationism, other false narratives about our history and prehistory are also becoming increasingly widespread in many parts of the world.

In India, the current government has been promoting unscientific ideas and claims by placing tradition, religion, and ideology above science. Interestingly, at the same time, India is the only country that has enshrined scientific temper in its constitution. Article 51A(h) of the Indian Constitution states "It shall be the duty of every citizen of India to develop the scientific temper, humanism and the spirit of inquiry and reform."

Previous Indian governments also had their share of promoting pseudoscience. Prime Minister Indira Gandhi, for example, took astrological advice. Promoting Ayurveda and homoeopathy is a long, unpleasant tradition. While earlier forms of officially promoting pseudo-medicine were established as early as 1995, the Modi government upgraded the Department of Indian Systems of Medicine and Homeopathy (ISM&H) to the Ministry of Ayush ("Rationalists Warn People" 2011).

Rationalists in India have long fought against such tendencies, often at the risk of their lives. Some of them, such as journalist Gauri Lankesh and physician Narendra Dabolkar, were assassinated (Yogesh 2018). Before that, political activists had vilified Dabolkar as anti-Indian because of his commitment to introducing a law against the exploitation of superstitious beliefs.

The recent exclusion of evolutionary theory from the science curriculum for secondary school students in India (Classes 9 and 10) reflects a broader ideological shift in educational policy ("Why Is India" 2023). The rationale behind this decision is based on the idea that the current narrative of history has been overly influenced by European and Arab perspectives, which are considered "foreign" and inherently anti-Indian. This curricular change is part of a wider attempt to present national history as an unbroken indigenous Hindu tradition, positioning India as the land of the Hindus and emphasising its timeless and foundational role in Indian identity.

The exclusion of evolution has prompted significant protests from the scientific community (Parvaiz 2023). As of 2025, Darwin's theory of evolution remains absent from NCERT science textbooks for Classes 9 and 10, having been removed during the rationalization of the syllabus in the era of the pandemic. Along with topics such as the periodic table, it has been relocated to the Class 12 curriculum, thereby limiting exposure to students who opt for science in higher secondary education. The continued exclusion of evolution highlights ongoing concerns about the politicization of science education in India.

In addition, *the claim is that* the origin of the Indo-European languages lies in India and that many scientific discoveries were known in India long before they were discovered elsewhere. A separate professorship was even established for this teaching at an elite university—IIT Kharagpur (Nanda 2022).

In contrast, new possibilities of ancient DNA (aDNA) analysis provide us with groundbreaking insights into our history and prehistory that defy such claims. Instead, this new research aligns with and provides additional insight into findings from other fields, such as linguistics—a fine example of the convergence of different scientific disciplines far beyond the natural sciences.

The contributions in the aDNA analysis field have given us a significant increase in knowledge regarding the origin of our species, *homo sapiens* (Callaway 2022). They confirm evolution as an explanatory model and, at the same time, shed new light on our origins and migrations. By extension, they also highlight those on various migrations that formed the current population of India (Reich 2018).

Regarding more recent prehistory, David Reich, professor of genetics at Harvard Medical School, points out similarities between the prehistory of Europe and South Asia (Reich 2019).

In both subcontinents, hunter-gatherers lived first. Then farming began. In Europe both farming technology and farmers came from Anatolia. In South Asia farming technology came from Persia and East Asia, and it is possible that this was accompanied by a large-scale movement of migrants from Persia too, although without ancient DNA from the relevant times and places we don't know for sure. Eventually, a group of pastoralists—the Yamnaya culture with their domestication of horses and use of chariots—spread, and their descendants impacted both subcontinents. The population in both areas today is a mixture of these three significant waves of immigration.

This aDNA analysis confirms the findings of linguistics and archaeology, which has demonstrated the similarity of Indo-European languages (Anthony 2010; Max Planck Institute for Evolutionary Anthropology 2023; Heggarty et al. 2023). The migration of the Yamnaya and their descendant cultures from the Eurasian steppes was almost certainly responsible for spreading these languages. Their origin is neither European nor South Asian.

The South Asian part of the story is presented in more detail in Tony Joseph's readable book *Early Indians* (Joseph 2018). It shows that the ancestors of all Indians were part of different waves of migration. The Yamnaya followed earlier migrations

of first hunter-gatherers and then agriculturalists.

No evidence supports the wishful thinking of the Indian nationalists. The migration occurred *to* India and not *out of* India.

This is also supported by analyzing religious texts. Early parts of the Rigveda, a Hindu religious scripture, not only point to a setting outside of South Asia (Anthony 2010; Daniyal 2015), but the multiplicity of gods is reminiscent of mythology in Persia, Greece, and Scandinavia.

While different groups intermingled at the beginning, this process came to a halt about 2,000 years ago, according to DNA analysis. Since then, the caste system has codified the genetic isolation of hundreds of groups living side by side but practicing endogamy only within their caste—long before the arrival of the Mughals or the British. The new possibilities of DNA analysis no longer allow any excuse, either that the caste system was supposedly a British invention or was socially permeable. The enforcement of the rigid caste regime is genetically proven.

The subordination of Dalits, against whom intense discrimination persists to this day, and "lower" castes in general are thus an age-old problem, even if the British understood how to use the system to their advantage. Religions such as Buddhism, Jainism, and Sikhism, or the materialistic philosophy of the Charvaka, tried to oppose the caste system. These worldviews, like Islam or Christianity later, allowed many lower caste members to break out of the social hierarchy. The architect of the Indian constitution, B.R. Ambedkar—a Dalit—therefore called for a mass conversion of Dalits to Buddhism (Roychowdhury 2020).

Thus, science—empirical historical research, linguistics, archaeology, paleontology, and natural sciences in general (DNA analyses in this case)—convergently moves us forward in our knowledge.

Tradition, religions, or indigenous, culturally embedded memories can point to actual events verified and adopted by science—if true. They are input to our understanding of the world but not independent truths. They are subject to rational criticism and must be compatible with scientific knowledge. ■

Note

A version of this article was previously published in German in *Skeptiker*. The translation into English is by the author.

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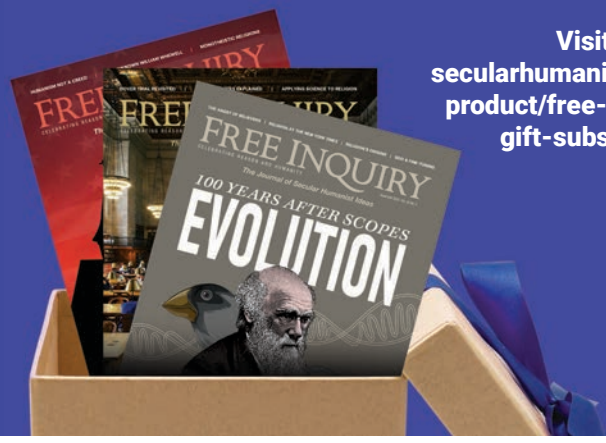

RESPONSE]

Response to Jean Mercer about the Reality of Parental Alienation

WILLIAM BERNET AND ALAN D. BLOTCKY

Our colleague Jean Mercer recently published a commentary about child custody and parental alienation (Skeptical Inquirer, March/April 2025). Mercer has contributed to the scholarly literature regarding parental alienation theory, such as criticisms of parental alienation research and concerns about the safety and efficacy of interventions for severely alienated children and adolescents. Mercer's new book, *Someone Said Parental Alienation* (2025), is an important study of several young adults who had previously been court-ordered into reunification programs with parents they had vigorously rejected and avoided.

The topic of parental alienation is one of the most controversial and polarizing aspects in the broad field of family law. Experts on both sides of the controversy agree that some parents dissuade their children from having contact with the other parent. For example, Mercer herself said, "It would be a mistake to claim that parents never persuade children to avoid their co-parents." However, there are significant disagreements among mental health and legal practitioners regarding the diagnosis of parental alienation and what to do once it has been identified.

What is parental alienation? It is a mental condition in which a child—usually one whose parents are engaged in a high-conflict separation or divorce—allies strongly with one parent and rejects a relationship with the other parent without a good reason. Parental alienation is usually created by the acts and words of the favored parent, who indoctrinates or influences the child to fear or shun the other parent. *Parental alienation* refers to the mental condition of the child; *alienating behaviors* refer to the activities of the favored parent. Just because a child avoids a relationship with a parent does not necessarily mean that the child was indoctrinated or influenced by the favored parent. Also—in reverse—there are many children subjected to alienating behaviors who do not become alienated from the targeted parent.

Parental alienation theory is unusual because of the vast amount of misinformation that has been published in journal articles and book chapters. The prevalence of misinformation regarding parental alienation theory is so great that it has compromised legitimate research on this topic and has been the basis of anti–parental alienation legislation in some states. We and our colleagues have worked hard to suppress this epidemic of fake news.

Mercer provided an example of misinformation at the conclusion of her commentary when she wrote: "It is a bigger mistake to believe that children who are afraid of one parent have no good reason for their fear. Assuming that parental alienation is present will cause adverse experiences and may cause tragedy." That statement is misleading because no proponent of parental alienation theory has ever suggested in a journal article or book chapter that a child custody evaluator should *assume* that parental alienation is present simply because a child fears one of their parents and refuses contact with that parent. That is a common misunderstanding of parental alienation theory: the notion that proponents of parental alienation believe that *all children* who manifest contact refusal were induced to reject a parent because of the influence of the favored parent. Although proponents of alienation theory agree that parental alienation is only one of several possible causes of parent-child contact problems, Mercer's statement of misinformation is very common. In our research, for example, we identified more than 100 examples of the same misinformation in mental health and legal writings. Indeed, the title of Mercer's new book, *Someone Said Parental Alienation*, strongly implies that custody evaluators, judges, and other family court actors are assuming that a child is experiencing parental alienation with little or no hard evidence.

There is far too much debate, bickering, and polarization in parental alienation scholarship. In Mercer's own terminology in *Someone Said Parental Alienation*, she would refer to the authors of this response as "alienationists" and would identify herself as an "anti-alienationist." We need to invest time, energy, and journal pages into searching for common ground and reducing this destructive level of polarization. ■

William Bernet, MD, is professor emeritus at Vanderbilt University.

Alan D. Blotcky, PhD, is a clinical associate professor of psychology at the University of Alabama at Birmingham.

RESPONSE]

Jean Mercer Responds

JEAN MERCER

Although it's generally thought that thesis plus antithesis is likely to yield a fruitful synthesis, Dr. William Bernet appears to think that ideas generally antithetical to his should be labeled "polarization," and specific disagreements should be called "misinformation." Some of his colleagues have similarly regarded any disagreement with parental alienation beliefs as "science denial."

I challenge Dr. Bernet and his colleagues to collect and analyze empirical, non-retrospective information from children and parents who are currently alleged to show parental alienation. Such foundational research would involve direct observation of both parent and child behavior rather than positing mental conditions (a term only recently applied to cases where children avoid one of their divorced parents). The publication of foundational research on parental alienation would be of far greater value than efforts to prevent dissemination of criticism, as described by Bernet and Jennifer Harman in a 2023 RetractionWatch statement. If proponents of parental alienation views provide some unquestionable evidence obtained by rigorous methods, they will find that the "polarization" disappears.

While science claims are a subject of disagreement in parental alienation discussions, the real problem is the weaponization of parental alienation in family courts and the resulting ill effects for children and their preferred parents. It's notable that the state anti–parental alienation legislation mentioned in the response to my commentary is in almost all cases named after a child of the relevant state who was murdered by a feared parent, after a court ordered the child into contact with the parent on the grounds that parental alienation had caused the fear. For example, Utah's Om's Law is in the name of a fifteen-year-old boy who had begged not to be sent to his father, who had argued that the mother had caused the boy to become alienated from him; the father shot him twice in the back and once in the face. Parental alienation views did not create a decision in the best interest of Om or several other children. If Bernet considers these statements "polarizing" or "misinformation," perhaps he will work to provide data that contradict them. ■

Jean Mercer, PhD, is a developmental psychologist who has been studying potentially harmful psychosocial treatments for children for twenty-five years.

[POSTCARDS FROM REALITY ROBYN E. BLUMNER

Robyn E. Blumner is president and CEO of the Center for Inquiry and executive director of the Richard Dawkins Foundation for Reason & Science. She is a lawyer who previously held posts as a syndicated columnist and editorial writer at the *Tampa Bay Times* and as executive director of the ACLU of Florida and ACLU of Utah.

Barry Karr Is Retiring—and That Is Not a Hoax

Well, all I can say is it's about to be perpetual Christmas for psychics, dowsers, haunted house barkers, faith healers, conspiracy theorists—and everyone who believes in them—because Barry Karr is hanging up his Rolodex.

The man who has held the modern skeptical movement together with a combination of indefatigable effort, total commitment to the cause, force of will, and a soupçon of snark, is retiring. His last day as executive director of the Committee for Skeptical Inquiry (CSI) was July 3, 2025.

Barry came to the Center for Inquiry before it was even named that. In its earliest iteration as the Committee for the Scientific Investigation of Claims of the Paranormal (CSICOP), Barry arrived on the scene during its fifth year of existence and Barry's twentieth.

Here, in his own words, is Barry describing his origin story:

> It is amazing really when you think about it: what the ramifications can be, at least for me, from an action that basically originated as an afterthought. You see, my sister was a senior at the State University of New York at Buffalo, and she had taken a part-time job with CSICOP, which her roommate had gotten for her. It seemed that they were still a bit short-staffed and needed some help with a large press mailing. After going through a couple of her friends she eventually thought of me, a sophomore at the university. She called me up and asked if I would like to work for a few hours a week between classes. I went into the office and did what they told me, which was, I believe, stuffing about 2,500 magazines into envelopes and helping to prepare them for mailing to members of the press around the country. Now how long it took to complete the task is uncertain. I like to think I must have made good time because by my third day there, and after a couple of other assignments, I was called into the office of Paul Kurtz for a job interview. I got the position by the way and have been involved with CSICOP ever since. Lucky for me my sister didn't have more friends. (Karr 2001, 47)

Now, forty-four years later, it is our luck that has run out. Barry is leaving for a well-deserved and well-earned retirement to spend time with his newly minted grandchildren and undoubtedly enjoy other activities he will finally have time to pursue.

Barry wasn't always as skeptical as he came to be. He admits to having written "a glowing wide-eyed book review of *Chariots of the Gods?*" To be fair that book and its thesis that ancient astronauts visited earth long ago held me in its thrall as well. That is, until it was so effectively debunked by people who actually examined the evidentiary claims. Thank you, skeptics, one and all!

And here is my conjecture on why Barry came to the conclusion that intercessory prayer is bollocks: The Buffalo Bills have never won a Superbowl, proving that the universe is unfeeling and unmoved. Buffalo Bills fans learned that the hard way.

Barry rose through the ranks at CSICOP, first as assistant public relations director and finally named to head its later incarnation, the Committee for Skeptical Inquiry (CSI). These days that is just one of many roles that Barry occupies. He is also the Center for Inquiry's chief financial officer and for all practical purposes chief operating officer. If you think of a one-man band, or better yet an on-stage plate spinner, you'll get the idea.

He is also the self-appointed chief of ensuring that nothing whatsoever botanical ends up as a pizza topping for the occasional Amherst staff lunches. Let's just say that nutritional science is not Barry's long suit.

In the 2001 book *Skeptical Odysseys*, which marked the twenty-fifth anniversary of CSICOP's founding, Barry wrote a reflective piece titled "Never a Dull Moment." He described the many highlights of his career with the organization (up until that time), including a memorable trip in 1988 to China along with other CSICOP paranormal investigators. They were enlisted to test a group of "psychic" girls who had become famous for their alleged supernatural abilities to read messages using their armpits.

James Alcock, who was on the trip as well, described an encounter with a Chinese psychologist who had observed and videoed the girls cheating. Alcock recalled:

> When I asked, "In that case, why do you need us to test them?" he asked, "Have you ever slopped pigs?" He had spent four years on a pig farm during Mao's Cultural Revolution, and wasn't going to risk anything that might put him at odds with the powers that be, and thereby risk being sent back to the farm.

Add to the reasons that people believe, spout, and accept abject nonsense the fear of having their lives ruined if they don't go along with the groupthink of the moment.

One of Barry's memories of the trip is as follows:

> I remember eating a spectacular dinner one evening with our hosts. To be honest I had no idea what some of what I was eating was. Sitting across from me and staring intently was James Randi. As I brought the chopsticks up to my mouth with a morsel of something, Randi burst out laugh-

> ing at me. I never knew what it was I ate. It was good, but I never wanted to know. (Karr 2001, 49)

Barry has been the backbone of the Center for Inquiry (CFI) for decades. When an important, complicated, or even mind-numbingly bureaucratic job has needed doing, it either falls to Barry to do it or to supervise getting it done. He thinks both big-picture and day-to-day.

In addition to keeping CFI's finances on track, Barry has put on numerous spectacular CSICon conferences—which somehow got better every year. He has organized and managed the CSI Fellows program, bringing the best academics, writers, and practitioners in the fields of science, critical thinking, and skepticism into its august pantheon. And Barry works each day to keep CSI's digital presence fresh and cutting edge. He has enlisted a coterie of writers to keep an interested public up to date on the latest outrages against medical science, common sense, and material reality.

As a response to the COVID-19 lockdowns, Barry created, curated, and produced the popular *Skeptical Inquirer Presents*, an online lecture series of the best that skepticism has to offer—a program so successful that even as things opened up again, we kept it going.

Barry has plenty of war stories about the years when he and his business office coworkers weren't sure week to week that they could meet payroll—though somehow they always did. Those days, thankfully, are behind us, and CFI now carefully budgets and maintains sufficient reserves to avoid such risks. And through it all, it was Barry who helped keep the ship afloat and sailing a true course.

He is an unsung hero—who is probably reading this annoyed that I am singing nonetheless.

***

Below are some anecdotes from the people Barry worked with most closely in recent years. They are told in the spirit of gentle ribbing. So, don't get the wrong idea; the humor covers for some honest despairing. Because to a person, we are saddened, shocked, and mildly freaked out at the thought of CFI without Barry.

Kenny Biddle

Story #1 – The second time I visited the CFI offices was around 2018, and I was here for a few days to work on a project with Joe Nickell. In conversation with Barry, he mentioned that there used to be fun Nerf battles in the office years before, but they kind of fizzled out. On that note, my wife and I went to a toy store that night and picked up some Nerf guns of our own, with a plan to ambush Barry the next morning. As we approached his office, Barry casually opened one of his many file cabinets and pulled out his own Nerf gun and ambushed *us*! It was a fun day and left a solid impression with me: Barry was serious when he needed to be but could also let loose and have fun with his coworkers and visitors like me. He was someone I'd be proud to work for. And years later, I got that opportunity.

Story #2 – On the morning that CSICon 2023 was to begin, I was with Barry and former CFI office manager Pat Beauchamp in the main hall of the convention. Barry was on the phone, screaming about cables not being secured. The fire marshal/inspector was on the way to inspect the area, and we might not be having a conference. He hung up the call and was yelling (at no one in particular) about how "I knew I should have gone with different people. *I knew it!*" He glanced at his phone, and his entire demeanor changed in an instant. He looked up from his phone with a big smile and said, "Oooh, the Bills won!" I could do nothing more than laugh. I had never seen someone change their entire behavior so quickly.

He's such a good person. I'm really going to miss him around the office.

Timothy Binga

Barry is not a luddite but pretty close. Back in 1997 when I started, the company paid for five AOL accounts, sharing modem lines and accounts with most of the staff (five staff members would share one master account). Barry steadfastly refused to update email accounts as CFI developed an Exchange server and eventually our Gmail server. He has adapted and added these plat-

Barry with Kenny Biddle

forms after a significant amount of ribbing, but he still has the AOL account and used it actively until a few years ago.

Barry and late *Free Inquiry* Editor Tom Flynn had notorious battles over various building additions, budget items, and so on. The longest lasting (and best remembered) one was the battle for the phones. Tom wanted a large number of phones on desks to act as a paging system for the building. Barry thought that Tom wanted too many, and the joke for years was about Barry not approving any phones.

The early computing days had many folks working for us as network administrators, mostly as folks who worked with the magazine subscription database. They came and went quickly. One time in 1999, Barry called me into his office. He was aware I had a computer business before working at CFI and asked me to take on the network/computer guy role until he found someone else. As of 2025, he still hasn't found anybody else.

Barry has continuing nightmares about bears. No one knows why.

Stephen Hupp

When I attended my first CSICon in 2012 (Nashville), at the end of the conference Barry invited the attendees to stick around as a group and give him feedback directly. I never experienced such a thing, and I learned that day how committed he was to effective science communication. (See also my tribute to Barry on page 6.)

Julia Lavarnway

Barry is king of the two-word (if that) email reply. Example:

Me: [two paragraphs with correct punctuation—I am an editor after all—explaining what I'm doing, when I'm going to do it, and why]

Barry: 👍

Obviously, Barry is a very busy man. CSICon doesn't organize itself; Barry pours nearly countless hours every year making them the amazing experiences they are. And that just scratches the surface. Organizing CSICon is on top of all his other duties as CFO, executive director of CSI, organizer of *Skeptical Inquirer Presents*, editor of skepticalinquirer.org, de facto COO … okay, I'm going to stop before my fingers completely cramp up.

So being that he's so busy and terse in his emails, you'd think he'd also be taciturn in person. Well, you'd be way wrong! If you happen to catch him on, say, a Friday afternoon when everyone tends to be winding down, that man can *talk*!

Barry and I share a few loves—The Beatles, musicals, and doggos are the first things that come to mind. Over the years, we have had many a wide-ranging, laugh-filled conversation on these topics, some lasting more than an hour. I will miss those Friday afternoons. If you ever find yourself in need of some good conversation, feel free to hit Barry up.

Ben Radford

Barry has always been a big part of the glue that has held CSICOP, and later CSI, together. While skeptics such as James Randi and Joe Nickell got the national media attention, Barry was behind the scenes helping coordinate the innumerable—and often invisible—daily organizational functions.

Tim Binga with Barry

Julia Lavarnway and Barry

Ben Radford and Barry

Barry with Jim Underdown

Debunking psychics on daytime talk shows is great, but somebody has to help organize conferences, send out fundraising letters, price out printing, and keep the lights on. Barry had to approve travel, and I remember being in Joe's office as we planned investigations together. While many of our investigations were done at our own expense and on our own time, some necessarily involved taking time out of the office. Barry recognized that our investigations not only provided fodder for Skeptical Inquirer but also drew coverage from news media around the world—from the BBC to *Unsolved Mysteries*—so it was a win-win situation. Still, there is a business side to investigating paranormal claims.

We'd submit receipts for our expenses to Barry, which might include anything from crop circle–making equipment to monster masks to weird little supposedly magical trinkets. We'd need a few days off to investigate a miracle in Ohio, a Bigfoot sighting in Canada, or psychics in Western New York; here's the hotel, gas, and food receipts. Barry would look the receipts over, kind of roll his eyes at the weirdness of it all ("You guys bought a haunted doll and mason jar of 'miracle healing water' for fifty-six dollars? *Really*?") and—with the occasional resigned sigh—say, *fine*. And then we all got back to work.

Jim Underdown

I have two favorite stories. One is really quick, and one is Barry's reaction to what might have been a disaster:

Story #1 – In his early days at CFI, a suddenly awestruck Barry found out that the person at the other end of a phone call was none other than Isaac Asimov.

Story #2 – The CFIIG (then the Independent Investigations Group, IIG) did a public test for the then-$50,000 Paranormal Challenge. By the end of the test, the "applicant" had not only passed the test but had shattered all odds in doing so.

While the IIG convened backstage, one of the mortified audience members in the Steve Allen Theater left and beelined home to post online how we'd been humiliated and lost the money. But he left too soon—the test had been rigged to demonstrate various ways a psychic might cheat on such a test.

The next day, there were three voicemails waiting for me: one from a calm James Randi asking what happened; one from a concerned Michael Shermer; and one from a very hot and bothered Barry Karr. "What the hell is going on there? I heard you lost $50,000! Call me!" ■

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[NOTES ON A STRANGE WORLD MASSIMO POLIDORO

Massimo Polidoro is a writer, lecturer, investigator of the unusual, and cofounder of CICAP, the Italian skeptics group. His YouTube channel is at @Massimo_Polidoro.

The Ancient Fear behind Modern Prophecies

At the Archaeological Museum of Palazzo Farnese in Piacenza, Italy, there is a curious and captivating artifact: a small polished bronze model of a sheep's liver covered in strange inscriptions. It was discovered in 1877 by a farmer plowing a field near Gossolengo, and experts soon identified it as Etruscan in origin, dating to the late second or early first century BCE.

But this was no mere anatomical reference model; the bronze liver was a tool for hepatoscopy, a form of divination in which priests interpreted the will of the gods by examining the livers of sacrificed animals—usually sheep. The model helped priests identify key areas of the liver and associate them with specific deities or omens. By comparing the actual sheep's liver with this template, they believed they could foresee the future.

While the Etruscans made the practice famous in Italy, hepatoscopy was far older. It originated in Mesopotamia and was practiced by the Babylonians more than 5,000 years ago. The Greeks adopted it later, and it became institutionalized under the Roman Empire. During Julius Caesar's reign, specialized priests called haruspices examined not only the liver but all entrails (aruspicina) to interpret omens before important decisions, from waging war to building infrastructure. The practice was eventually outlawed under Emperor Theodosius I in the fourth century CE with the rise of Christianity, which sought to replace pagan rituals with monotheistic orthodoxy.

And yet, while the rituals may have vanished, the mindset persists.

Controlling Fear

Science fiction writer H.P. Lovecraft once observed, "The oldest and strongest emotion of mankind is fear, and the oldest and strongest kind of fear is fear of the unknown" (Lovecraft 1927). That fear, and our attempts to tame it, may explain why divination emerged in so many cultures and why modern equivalents still thrive today.

The Liver of Piacenza with a diagram and Etruscan inscriptions.

Contemporary psychology confirms what Lovecraft intuited: uncertainty is a major trigger for anxiety. Not knowing what's coming next—whether in health, finance, or politics—creates a psychological discomfort we are desperate to resolve. And when faced with frightening, complex phenomena such as earthquakes, plagues, or economic collapse, our ancestors had no scientific explanations. The simplest answer was that powerful supernatural beings were behind it. As mathematician Ian Stewart put it, "The gods had power over nature; they did what they wanted, when they wanted, and ordinary people just had to suffer the consequences" (Stewart 2019).

But that belief offered a kind of hope. If the gods could be angered, they might also be appeased. Through rituals and sacrifices, people believed they could influence events—or at least make sense of them. In this way, divination was not merely superstition. It was an attempt to regain control in a chaotic world. And this illusion of control has proven remarkably persistent.

An Eternal Urge

Even today, belief in astrology, tarot cards, and psychic predictions surges during times of upheaval. After the 2008 financial crisis began, consultations with astrologers reportedly rose sharply (Singer 2008). During the COVID-19 pandemic, online psychic services saw dramatic increases in traffic (Sachdeva 2020). Uncertainty, it seems, breeds prophecy.

A striking modern example comes from Japan, where *omikuji*—fortune-telling paper slips drawn at temples and shrines—remain a popular tradition. In times of personal or national stress, long lines form at these spiritual sites. People don't always literally believe in the fortunes they receive, but the ritual provides a temporary sense of clarity, a story they can hold onto amid the noise.

We know, rationally, that earthquakes are caused by tectonic movement, not divine retribution. Yet the same emotional impulse that led the Etruscans to peer into sheep livers is still with us. We long to glimpse the future, to find patterns in the chaos, and to believe that with the right knowledge—or the right ritual—we can influence our fate.

The artifacts may have changed, but the fear remains. And so does the human urge to tame the unknown with stories of what might come next. ■

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[BEHAVIOR & BELIEF STUART VYSE

Stuart Vyse is a psychologist and author of *Believing in Magic: The Psychology of Superstition*, which won the William James Book Award of the American Psychological Association. He is a fellow of the Committee for Skeptical Inquiry.

The Demise of the American Society for Psychical Research

After my emails to the American Society for Psychical Research went unanswered, I decided to look a bit deeper into what is going on at the organization. What I found was shocking.

As readers of this column know, your correspondent has an interest in the spiritualism movement of the nineteenth and early twentieth centuries. In previous columns, I've written about Ouija boards (Vyse 2024), spiritualism's influence on abstract art (Vyse 2022), and my visit to the offices of the Society for Psychical Research in London (Vyse 2025). For the past six months, as part of a new research project, I have been trying to visit the archives of the American Society for Psychical Research (ASPR) in New York City, but to date I have been unable to pierce the shell of the organization. This kind of difficulty is quite unusual, because as a general rule archivists are wonderfully helpful people. They are often librarians or have a background in library science, and in my experience—like many librarians—they bend over backward to help you find the most obscure items. I have spent many pleasant hours alone at a table with piles of ancient documents that have been lovingly retrieved for me by a dedicated archivist—all at no cost to me. I love archivists.

I am not alone in having difficulties with the ASPR. While researching her book *Common Phantoms: An American History of Psychical Science*, Alicia Puglionesi also experienced unanswered emails and voicemail messages, so she took the drastic step of traveling to New York and appearing at the door of the building then occupied by the ASPR. She sat there reading a copy of

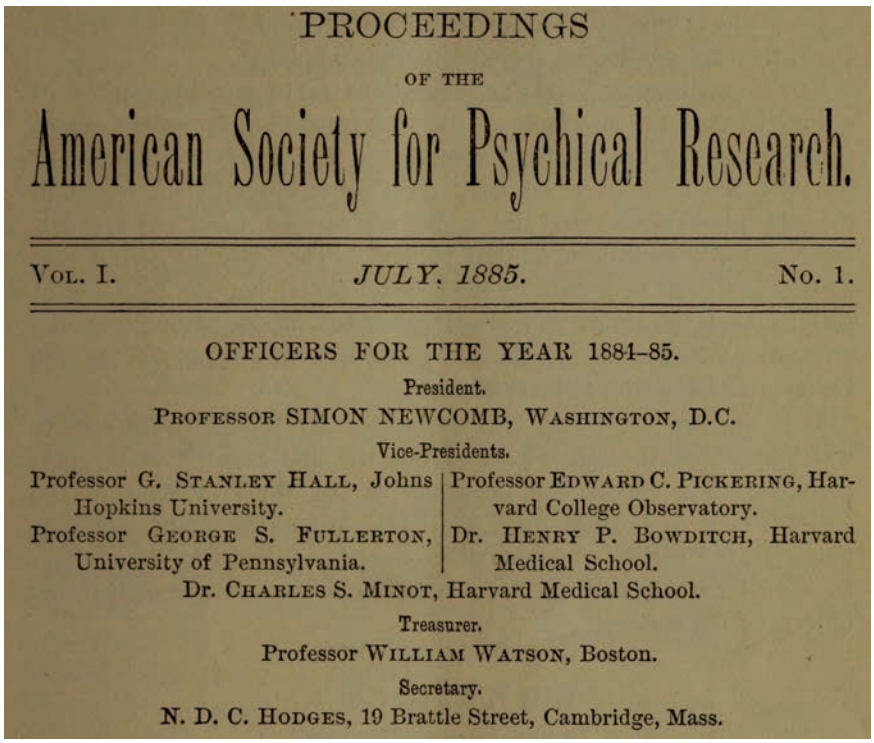
William James's *Varieties of Religious Experience* and periodically engaging in "rounds of obnoxious bell-ringing" (Puglionesi 2020, 7). Eventually, Puglionesi's efforts were rewarded, and the long-time president[1] of the ASPR let her in. The woman explained that she had concerns about "unscrupulous media coverage" and as a result carefully screened requests for access. As my foregoing descriptions of archivists suggests, this is also highly unusual behavior. When I dug further, I realized that there were other reasons the staff of the ASPR might be shy about outsiders.

* * *

The ASPR has a long and storied—but also rather tumultuous—history. The first psychical research organization, the Society for Psychical Research (SPR) was formed in London in 1882. Its first president was Henry Sidgwick, a professor of philosophy at Trinity College, Cambridge, and its earliest members included esteemed academics from a wide range of fields. One of its early presidents was Arthur Balfour, who went on to become prime minister of the United Kingdom. Some of the SPRs earliest activities involved collecting public reports of apparitions and other paranormal phenomena. In addition, the group investigated many psychic mediums, often exposing them as frauds. Almost a century and a half after its founding, the SPR continues as an active organization today, producing a speaker series, publishing a magazine and journal, and maintaining the Psi Encyclopedia (https://psi-encyclopedia.spr.ac.uk/), a very valuable resource for historians of the paranormal.

Famous American psychologist William James was fascinated by spiritualism, and he became an early member of the SPR, serving as president from 1894–1895. Soon after the formation of the SPR, James and others proposed the establishment of an American society. The ASPR was founded in 1884, initially in Boston. The first president of the organization was astronomer Simon Newcomb, and among the first vice presidents was psychologist G. Stanley Hall, then of Johns Hopkins University. Australian paranormal investigator Richard Hodgson served as the first secretary of the ASPR, working extensively with famed Boston medium Leonora Piper, whom he came to believe was able to communicate with spirits of the dead (Matlock 2019).[2]

After Hodgson's sudden death from a heart attack in 1905, the ASPR—which had always been financially insecure—began a period of instability. Eventually, the three vice presidents, William James, James Hyslop (a Columbia University professor of logic and ethics), and George Dorr, chose to dissolve the ASPR, promising to publish reports of all the investigations conducted up to Hodgson's death (James 1986, 12–13). The ASPR had been founded as a branch of the British SPR, but after Hodgson's death, Hyslop created a new organization, eventually adopting the same name, that was independent of the British branch. Over the years, various divisions emerged, and in 1925, a splinter group founded the Boston Society for Psychical Research. The two groups reunited in 1941, after which the ASPR experienced a resurgence of activity and membership that lasted into the mid-1970s, which was attributed to the leadership of eminent American psychologist Gardner Murphy, who served as president of the American Psychological Association in 1944 and president of the British Society for Psychical Research in 1949. In the 1990s, the APSR started



PROCEEDINGS

OF THE

American Society for Psychical Research.

VOL. I. *JULY, 1885.* NO. 1.

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1. have refrained from using the names of the officers of the ASPR in this article to give them the benefit of the doubt and not further sully their reputations. For those who care to look, the names can easily be found.

2. See Matlock 2019 for a concise history of the American Society for Psychical Research.

a period of decline, but it continued to exist as a nonprofit educational organization with offices in New York City. Until now.

* * *

Alicia Puglionesi first approached the ASPR in 2012, and when she finally was let into the building to do her research, she attributed much of the disorder she encountered to "the skeletal staffing and lack of funds that made the building so difficult to access" (Puglionesi 2020, 7). From what I can glean, her assessment is only partially true. I first started my efforts to gain access in Fall 2024. After several failed attempts via email and phone, I went so far as to join the ASPR at a cost of $100. The organization maintains a website (http://www.aspr.com/) that looks like it was built back when we were all using Netscape browsers, but the site accepts payment via most credit cards or PayPal for membership categories that range from $70 to $260. So, I entered my information and my money was taken, but I received no email welcoming me to the organization. The only acknowledgment of membership was an email receipt from PayPal. I did, however, receive a late-December email from the president of ASPR urging me to consider a tax-deductible year-end donation.

Eventually, I did get a call back from the current executive director of ASPR on January 8, 2025. We had a very pleasant fifteen-minute chat, during which she said things were a bit chaotic at ASPR because they were moving the office, but she urged me to write an email directly to her detailing the archived items I was most interested in pursuing. I emailed her the next day, but I never heard back.

Follow the Money

The ASPR is a 501(c)(3) tax-exempt corporation, and as a result, the organization is required to file an annual IRS Form 990, providing basic financial data. Because 990s are public information, ProPublica's Nonprofit Explorer website (https://projects.propublica.org/nonprofits/) publishes filings for millions of nonprofits. As of this writing, the most recent 990 for the ASPR is from 2023, during which the organization reported $4,053,254 in contributions and $111,868 in investment income for a total revenue of just under $4.2 million. The ASPR also reported $180,576 in executive compensation and $37,400 in "other salaries and wages," with a total salary of $199,000 going to one employee—the executive director, who was the same woman who talked to me on the phone. Finally, ASPR reported $3,586,436 in assets and $954,841 in liabilities, which resulted in $2,631,595 in net assets. So, although these numbers represent a relatively small nonprofit, the ASPR was far from a penniless organization. However, seeing the true picture of ASPR's finances requires digging deeper.

Bloggers Tom Ruffles and James A. Conrad have done a detailed analysis of the ASPR's finances that reveals a shrinking organization gutted by its board members and staff (Ruffles and Conrad 2025). Much of the story involves a beautiful townhouse at 5 W 73 Street on Manhattan's West Side (see the photo on page 20) that was given to the ASPR by a wealthy inventor in 1966. Between 2002 and 2019, the organization took out a series of mortgages against the building totaling over $12 million, and in 2019, the ASPR loaned $1,770,000 to a person identified as "president/trustee" for the purpose of "working capital." (As recently as the 2023 Form 990 on ProPublica's site, the organization reported "conflict of interest transactions.")

Apparently unable to pay back the mortgages against the property, the ASPR attempted to sell the building in 2019 for a listing price of $17.995 million. A news article about the offering described the property this way: "Beaux-Arts mansion is an Upper West Side architectural icon with Dakota views." The six-story building was

The Dakota as seen from Central Park West. Photo credit: Ajay Suresh.

said to contain "18 rooms including 9 bedrooms, 9 fireplaces and 7 baths. The singularly stunning parlor floor overlooking the Dakota is the home's showpiece, perfect for entertaining in grand Manhattan style" (Cohen 2019). The iconic Dakota cooperative apartment has at various points been home to John Lennon, Yoko Ono, Leonard Bernstein, and Lauren Bacall, among other celebrities, and sits at the corner of 72nd and Central Park West.

On this occasion, the ASPR building did not sell.

Finally, in 2020, the New York Supreme Court brought a foreclosure case against the ASPR with regard to the "mortgaged property at 5 West 73rd Street, NY, New York," and a judge ordered the building sold at auction. As reported by Traded.co (n.d.), the building eventually sold in June 2024 for $11.75 million, which Ruffles and Conrad indicated was less than the sum of the ASPR's obligations. Unbeknownst to me, long before I began trying to get into their archives, the ASPR had all but completely collapsed.

Today the website of the ASPR is a shell of its former self. It lists a phone number and a new address, which turns out to be a rented mailbox at Manhattan Express Shipping on Columbus Avenue in New York. The website still accepts credit card payments for various levels of "membership," but I don't recommend anyone joining. Ruffles and Conrad, who seem to care about the organization, have registered complaints with the Charities Bureau of the New York Attorneys General Office and have promoted a Change.org petition titled "Save the American Society for Psychical Research!" Anyone who would like to learn more about the ASPR's finances is encouraged to read Ruffles and Conrad's excruciatingly detailed and documented blog post (Ruffles and Conrad 2025).

Why Does This Matter?

You are reading this article in Skeptical Inquirer magazine, and so you might be wondering why your correspondent cares about this. You might be thinking, "As a skeptic, why aren't you savoring the schadenfreude of the implosion of an organization devoted to studying—and at times promoting—things about which you are deeply skeptical?" Despite retaining my skeptical view, this is not how I feel at all.

Whatever you may think of spiritualism, telepathy, or apparitions, the ASPR played an important role in the history of psychology, as well as of the larger culture of the late nineteenth and early twentieth centuries in the United States. The fundraising email I received in December 2024 claimed "our archives include important original letters from historical figures including William James and his brother, Henry James, William Butler Yates, Upton Sinclair, Sir Arthur Conan Doyle, and Houdini." The email also reported that ASPR owned rare spirit drawings and photographs. By the time I received the email, the ASPR's archives were probably sitting in a storage unit. The only allusion to the organization's problems was the following: "It has been a challenging time. Our library and archives are secure and we look forward to our future in a new location."

This is a tragedy. As Ruffles and Conrad point out, most responsible organizations like ASPR arrange to deposit their archival materials—letters, documents, and photographs—with a university library. A perfect example of this choice is the ASPR's original parent organization, the Society for Psychical Research in London. As I described in a recent column, the SPR maintains an office and a library in London but has deposited its archival materials with the Cambridge University Library, where researchers can easily access them in a safe environment (Vyse 2025). Similarly, the New York–based Parapsychological Foundation, Inc., donated its holdings to the Albin O. Kuhn Library of the University of Maryland Baltimore County (Moore 2022).

In addition to squandering a fabulously valuable mansion, the trustees of the ASPR have not acted responsibly to secure the materials they possess. What good are historic archival documents if they are gathering dust in a storage unit and are not available to researchers? The ASPR website does not include an inventory of their holdings, so the archives are completely opaque to the outside world. Having lost millions of dollars of real estate, is the ASPR holding on to the archives for their potential monetary value? It is impossible to know. What we do know is that the organization has almost no profile—no events, no active publications, no public offices, and a meager website. The only visible activities of the ASPR seem to be requesting and accepting money. This is a tragic ending to a long and important history. ■

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[THE PRACTICAL SKEPTIC MICK WEST

Mick West is a writer, investigator, and debunker who enjoys looking into the evidence behind conspiracy theories and strange phenomena and then explaining what is actually going on. He runs the Metabunk forum and is the author of the book *Escaping the Rabbit Hole*.

Is 'Extraordinary Evidence' Unreasonable?

The statement that extraordinary claims require extraordinary evidence is a familiar one to skeptics. But it is one that can be counterproductive. Is it time to rethink both the phrase and our knee-jerk repetition of it? Here I'll delve into the history and criticism of it as well as my own practical experience examining UFOs and remote viewing.

We associate "extraordinary claims require extraordinary evidence" with Carl Sagan. But what is sometimes referred to as "the Sagan Standard" has a long history, going back nearly 300 years before Sagan.

The earliest recognizable form comes from an English priest named Benjamin Bayley. He was writing about a timeless subject: predictions of the end of the world. Then, as now, people often claimed to have received revelations as to the date of the apocalypse directly from God. Bayley wrote in 1708 that "these Matters being very extraordinary, will require a very extraordinary Proof." (All historical quotes here are taken from O'Toole 2021.)

The religious context continued for some decades, with subsequent formulations focusing on either miracles or divine revelation. What perhaps sets these early versions apart from the modern skeptical movement is that miracles and messages from God were things that the writers of the time believed to be real. The focus of the Sagan Standard was not on proving or disproving a phenomenon in general, but instead on examining a particular claimed instance of that phenomenon to sort the real miracles from the fakes and mistakes.

But the modern usage dates back a surprisingly long way to David Hume, who in 1748 gave a general sounding version: "A wise man, therefore, proportions his belief to the evidence." While this was in a section of *An Essay Concerning Human Understanding* titled "Of Miracles," Hume was deeply skeptical of divine intervention, and his writing, while often long-winded, rings curiously familiar to the modern skeptic. I encourage you to give it a read (Hume

1748).

Hume's argument (which he optimistically claimed to be "an everlasting check to all kinds of superstitious delusion") is one of probability. Some things are incredibly consistent: the Sun always rises, and the dead never do. Some things are less consistent: the weather is usually better in June than in December, but not always.

Hume then goes on to discuss the weight we should give eyewitnesses in such cases and states a form of the Sagan Standard specifically for the testimony of those eyewitnesses: "Suppose, for instance, that the fact, which the testimony endeavours to establish, partakes of the extraordinary and the marvellous; in that case, the evidence, resulting from the testimony, admits of a diminution, greater or less, in proportion as the fact is more or less unusual."

Simply put, the more "extraordinary and marvelous" the claim, the less we can rely on testimony to back up that claim. In other words, extraordinary claims need *better quality* evidence.

But do they need *extraordinary* evidence?

Modern Objections

There have been several other versions of the Sagan Standard. Fifty-two years after Hume, in 1810, Pierre-Simon Laplace said, "The more extraordinary a fact is, the more it needs to be supported by strong evidence." Again, this was not "extraordinary" evidence, but the lure of alliteration proved too strong for later writers. Multiple writers in the 1800s called for "extraordinary" evidence or proof.

The late 1900s brought us the modern writers we are familiar with. Marcello Truzzi, a founder of CSICOP, is often credited as re-popularizing the phrase. Notable CSI fellows, such as Kendrick Frazier, Carl Sagan, and James Oberg, have all been strong proponents of the Sagan Standard.

How could people possibly object to this long-held skeptical standard? The most common argument against the Sagan Standard is that it establishes an unfair burden of "extraordinary" evidence that is not shared by mainstream science. If certain levels of statistical significance are good enough for the pharmaceutical industry to establish the efficacy of a drug, then why are those same standards not sufficient to establish the validity of remote viewing? And if eyewitness testimony is sufficient to have a person convicted of murder, why is it not enough to establish that anomalous flying craft (UFOs) exist?

In other words, the UFOlogists and parapsychologists are crying "not fair!" It's one rule for them and another for us. The game, they think, is rigged.

You might have recognized the two objections (statistics and eyewitnesses) as the two topics that Hume constructed his argument around, and I think the answers to the objections can be found in careful consideration of Hume's work. But first, what specifically are the objections?

UFOs and the Extraordinary

One of the most influential UFOlogists of the past decade is Garry P. Nolan, an immunologist and biotech executive who has been deeply involved in promoting UFO whistleblowers and lobbying for government action. Nolan posted on what was then Twitter: "Science doesn't care whether the claim is extraordinary or not. It simply arbitrates if the evidence is sufficient. The extraordinary claims/evidence meme is pretentious nonsense" (Nolan 2023).

Nolan here is essentially correct, though tautologically so. Obviously, if evidence is sufficient, then, well, that's good enough; it's in the definition. But what he doesn't really address is if the nature of the evidence required to be sufficient is qualitatively different for "extraordinary" claims.

What actually *is* an extraordinary claim? Hume defines it as a claim that has "seldom fallen under our observations"—i.e., something we have not seen much. But really, it's something we have *never* observed with confidence. It's a subjective thing in that it depends upon the experience of the individual.

Hume gives the example of an Indian prince. Living in a tropical climate, he has never seen or heard of ice. When someone tells him that at a specific temperature water will suddenly become a transparent solid, he is rightly skeptical. It sounds like magic. His visitors, in the 1700s, could not bring him ice, nor could they provide him with photos. So, he's justified in being skeptical of the eyewitnesses and demanding sufficient evidence. He must see the ice for himself.

Laplace gives a more abstract example. An urn contains a million balls, all of which are white except for one, which is black. What evidence would be sufficient to prove a black ball existed? Clearly, it's not extraordinary at all; you only need to show the one black ball. But would you take eyewitness testimony? Would you accept a photograph? If you'd spent the past year pulling out 100,000 white balls, you would perhaps be justified in thinking that the black ball is possibly nonexistent.

Which of these two examples is more like UFOs? The UFOlogists might argue that it's the urn of a million balls. They are looking for a needle in a haystack, and once they find it their case will be made.

But an urn full of balls isn't breaking any laws of nature. It's a trivial thing for a ball to be black rather than white. We simply haven't seen any yet. When we do, it's not really going to change anything at all.

Water becoming solid, by the prince's understanding, seemed to break the laws of nature. It wasn't, for him, simply an uncommon thing. It was unnatural, defying all sensibility. It was, in a word, *extraordinary.*

An extraordinary claim isn't one that is merely infrequently observed; it is one that violates our understanding of the universe. It is something that has never been observed and that breaks the laws of physics.

The claims of UFOlogists fall largely in the realm of the extraordinary. They claim novel forms of propulsion that are theoretical at best. They claim impossible-sounding things, such as UFOs turning off nuclear weapons and undetectable abductions. They increasingly claim psychic connections with alien beings, a phenomenon that has never been demonstrated and has no under-

standable mechanism in our science. Extraordinary claims.

Extraordinary Psychic Claims

Claims of psychic powers seem like the easiest topic to apply the Sagan Standard to. Clear violations of physics, macro actions at a distance, and predicting the future; these are all things that violate our understanding of the universe. We demand extraordinary evidence!

And the parapsychologists, to varying degrees, seem eager to give it to us. Unfortunately, psychic powers such as remote viewing, predicting the future, or influencing the results of random number generators cannot be demonstrated with a single clear example, such as the change from water to ice. The proof of ESP, its proponents claim, lies in experiments that simply reveal answers better than chance in the aggregate. For example, if the claim is predicting the toss of a coin, then getting 700 right out of 1,000 would be very good evidence provided it is repeatable and all other confounding factors have been eliminated by careful experimental design.

Some parapsychologists have attempted to satisfy the demands of skeptics, designing carefully controlled experiments. They even have results that, by normal standards, would prove a claim. Yet they are not accepted by mainstream science. Is this fair? Richard Wiseman controversially said: "I agree that by the standards of any other area of science that remote viewing is proven, but begs the question: Do we need higher standards of evidence when we study the paranormal? I think we do" (Penman 2008).

Parapsychologists latched onto the first part—at last, acceptance by science—only to have their hopes dashed by the rest of the sentence. They were being held to different standards, they cried, quite correctly. But Wiseman, like Hume, explained *why* there was that difference: "Because remote viewing is such an outlandish claim that will revolutionise the world, we need overwhelming evidence before we draw any conclusions. Right now we don't have that evidence."

What Is a Skeptic to Do?

It is perhaps unfortunate that the catchy phrase of "Extraordinary claims require extraordinary evidence" caught on. The somewhat hyperbolic but poorly defined requirement for "extraordinary evidence" opens us up to accusations of simple prejudice against these alternative science topics. Could we perhaps come up with something better?

Wiseman avoided it in the *Daily Mail*, opting for "outlandish claims … need overwhelming evidence." This avoids the "extraordinary" requirement but might be seen as prejudicial to the subject with "outlandish."

There have been other attempts to make it more palatable. Daniel Loxton opted for "wonderful phenomena demand wonderful evidence" after magician Joseph Rinn's 1906 phrasing. This has the great benefit of making the claim a "wonderful phenomenon," which sounds great.

But I fear a simple, useful phrase might be elusive. The topic is complex and nuanced, and any phrasing is open to misinterpretation. The Sagan Standard is catchy but can be misleading and distracting, leading us to pigeonhole both claims and evidence. Hume's framework of proportional belief based on prior experience and the quality of evidence remains more useful. Rather than communicating with catchphrases, perhaps we skeptics should focus on explaining *why* some claims require stronger support. ■

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[THE TIME WARP: SKEPTICISM REVISITED—FROM THE FUTURE

CRAIG A. FOSTER AND KELSEY M. MCGINN

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Imagine Pandas

Welcome aboard, friends! In the Time Warp, we aren't limited to present-day examinations. We use Skeptical Inquirer's rich history to examine skepticism … from the future. On this voyage, we travel to Fall 1979 to visit the ninth issue.

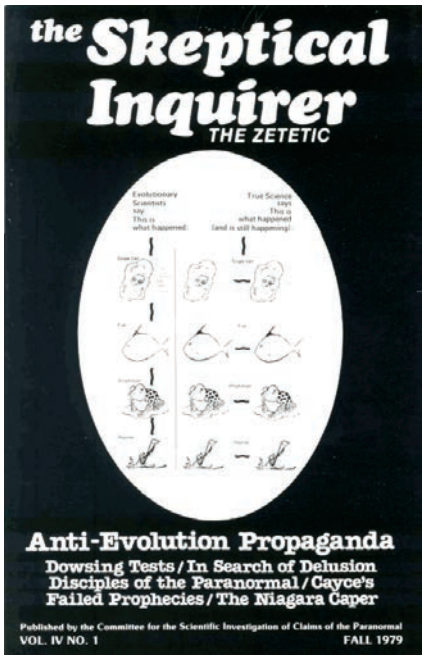
Some news and pop culture to dial us in: The Knack's "My Sharona" ran for six weeks as the #1 hit (beginning August 25, 1979); Weird Al Yankovic turned the song into his debut hit, "My Bologna" (released December 25, 1979). CompuServe launched the first dial-up online information service for individual consumers (September 24, 1979). Congress approved the creation of the Department of Education (September 27, 1979). The movie *10* was released (October 5, 1979) and included a brief refence to biorhythms in addition to its iconic Bo Derek beach running scene. And Skeptical Inquirer was there, turning its high-powered intellectual telescope to unconventional beliefs.

Some Skeptical Thoughts from the Time

Paul Kurtz responded to claims that CSICOP was engaging in scientism. Kurtz distinguished developing science from "the muddled pretensions of pseudoscientists" (p. 44). Kurtz also contended that skepticism about paranormal claims benefited the public.

William Sims Bainbridge surveyed 379 people at a 1978 science fiction convention in Phoenix, Arizona. The results suggested that pseudo-documentaries and fictional stories contribute to the development of paranormal beliefs.

James Randi created a dowsing contest in Italy offering $10,000 of his own funds to any winner. Four dowsers


the Skeptical Inquirer
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Anti-Evolution Propaganda
Dowsing Tests / In Search of Delusion
Disciples of the Paranormal / Cayce's
Failed Prophecies / The Niagara Caper
Published by the Committee for the Scientific Investigation of Claims of the Paranormal
VOL. IV NO. 1
FALL 1979

participated in controlled tests. Each dowser failed, but they still consumed "many bottles of spirits" with Randi afterward (p. 20).

Anthony Standen described how the term *unidentified flying object* puts "misleading ideas into the mind" (p. 46) and suggested that a term such as *unexplained aerial appearance* would reduce the implication that a flying object had been present; forty years later, *unidentified anomalous phenomena* would come into vogue.

Randi discredited Edgar Cayce's purported ability to remotely treat medical conditions and find treasure. Randi, for instance, described the excuses offered after Cayce diagnosed two people who—unbeknownst to Cayce—had already died.

Laurie R. Godfrey encouraged educators to resist political pressures to equivocate bad scientific claims with legitimate scientific claims. Godfrey's analysis focused primarily on evolution. Godfrey's contribution was also the first SI feature article devoted substantively to creationism.

When Pandas Took the Netherlands

The significance of Godfrey's work notwithstanding, we dive into Hans van Kampen's article "The Case of the Lost Panda." This sneaky important story about a lost red panda is unlikely to repeat itself, so we better take advantage of it now.

According to van Kampen, a small panda escaped from a Rotterdam Zoo on December 10, 1978. Zoo officials notified a local newspaper. Unfortunately, the panda was found deceased on a railroad track about 500 meters from its shelter around the same time the news of the missing panda was shared publicly.

People from all over the Netherlands, unaware that the panda had been found, called the zoo with tips about finding the lost panda. The phone calls ended a few days later after the newspaper informed the public that the panda had died.

In its own sad way, the lost panda produced a naturally occurring research study, one that researchers can't create due to ethical concerns. Van Kampen clearly recognized this facet of the missing panda story and used the story to consider recent reports about UFOs. But the panda story informs the analysis of any claim that relies heavily on human testimony. Today, the more obvious comparative would probably be Bigfoot.

The case for Bigfoot relies heavily

Mathias Appel | Wikipedia

on human testimony about having seen, or in some cases heard, the biped. The conventional scientific view is that Bigfoot does not exist, which means that the people who report seeing or hearing Bigfoot are either mistaken or lying. Of course, Bigfoot enthusiasts disagree, contending that at least some testimonies about witnessing Bigfoot are accurate.

The case of the lost panda differs from this Bigfoot back-and-forth in one supremely important way. We can safely assume that there were, in fact, no stray pandas roaming the Netherlands. The panda in question didn't meander around the Netherlands—like Billy sometimes did in *The Family Circus* comic—only to return about 500 meters from the zoo before dying. We can also assume that there weren't any other rogue pandas roaming the Netherlands at the same time. The absence of an actual panda establishes that many sincere public reports about a panda presence occurred *where there was no real panda*. This stands in contrast to Bigfoot reports where, despite the evidence to the contrary, believers can still argue that Bigfoot was truly there.

Voilà! In one lost panda story, we have a clear demonstration that people can report evidence for an animal they did not actually encounter, also now known as "the red panda effect." If the newspaper hadn't reported the panda's demise, locals would probably still be telling tales about the panda being right there in front of them, clear as anything!

Post-Trip Summary

Of course, the panda story—and all the corroborating psychological research (thank you Elizabeth Loftus!)—does not definitively prove that Bigfoot, leprechauns, and all sorts of other things don't exist. Bertrand Russell has already described the challenges in proving that there isn't a teapot orbiting the Sun.

However, the panda story does underline, bold, and highlight human error as an explanation for any paranormal claim that relies heavily on witness reports. It isn't reasonable to conclude that Bigfoot exists—despite the ongoing inability to find Bigfoot bones, hair, scat, or fossils—when misperception and fraud sit there as established explanations.

Human perception and memory simply aren't as reliable as people would like to believe. That's understandable. It's difficult for anybody to comprehend that a fondly remembered hookup at Woodstock was really just a basement make-out session accompanied by a Monkees record. But humans need to develop more humility about their own cognitive processing if they want to stay in the land of reasonable claims. Until people figure that out, they're more likely to get bamboozled.

Foster: Addendum

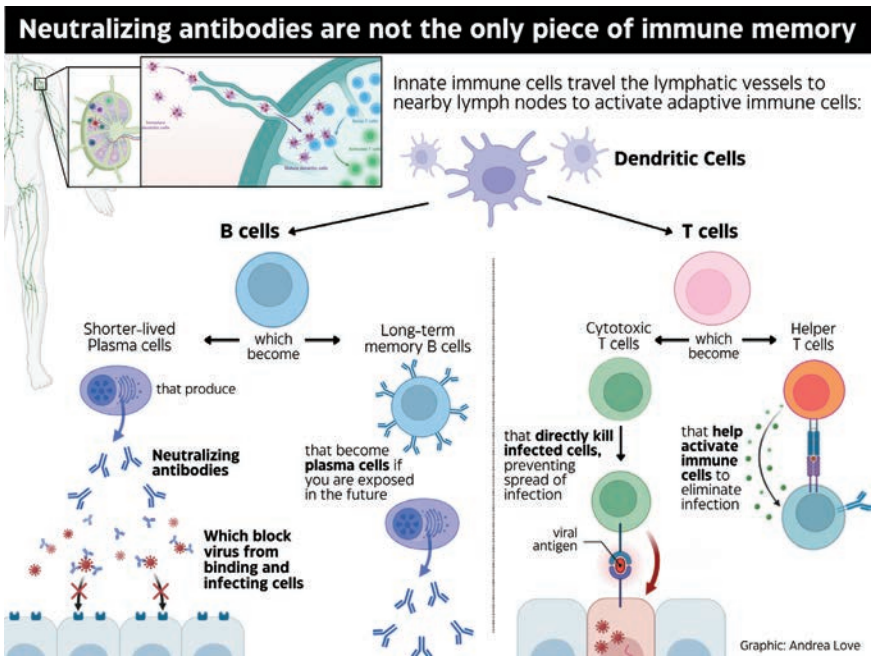
I developed The Time Warp column while I was teaching a Psychology of Pseudoscience class at SUNY Cortland. Students worked individually, and eventually in pairs, to create Time Warp–style columns using Skeptical Inquirer issues ranging from Spring/Summer 1977 (Volume 1, no. 2) to Fall 1979 (Volume 4, no. 1). I used the inaugural Fall/Winter 1976 issue (Volume 1, no. 1) to provide an example. As the published form of The Time Warp churned through those old issues, I sometimes worked with former students as we translated their original work into its published form. This Time Warp column marks the end of that sequence. I sadly retired the course when I left SUNY Cortland in 2023. I want to thank the students for making that class so enjoyable and my coauthors for their extra dedication. Go, Red Dragons! ■

[INSIDE IMMUNITY ANDREA LOVE

Andrea Love, PhD, is an immunologist and microbiologist with over a decade of experience. She is a subject-matter expert in infectious disease immunology, cancer immunology, and autoimmunity and is adept at translating complex scientific data and topics for the public and healthcare providers. Love is the author of *Immunologic*, a newsletter and science information hub, and is the executive director of the American Lyme Disease Foundation.

Moving Vaccine Goalposts: Sterilizing Immunity Was Never the Standard

Something called "sterilizing immunity" is the latest anti-vaccine rallying cry. Sterilizing immunity is a real thing; the problem is that it's been co-opted by anti-vaccine activists to undermine vaccines. By the current anti-vax logic, if a vaccine doesn't induce sterilizing immunity—that is, if it doesn't block *all* infections—the vaccine is a "failure." This rhetoric has gained traction since the COVID-19 pandemic, with influencers repeating it on podcasts, blogs, and even the Senate floor. This notion is not just immunologically wrong; it's a deliberate tactic designed to erode trust in vaccines and harm public health. And it's working.


Neutralizing antibodies are not the only piece of immune memory
Innate immune cells travel the lymphatic vessels to nearby lymph nodes to activate adaptive immune cells:
Dendritic Cells
B cells
T cells
Shorter-lived Plasma cells
which become
Long-term memory B cells
that produce
Neutralizing antibodies
that become plasma cells if you are exposed in the future
Which block virus from binding and infecting cells
Cytotoxic T cells
which become
Helper T cells
that directly kill infected cells, preventing spread of infection
that help activate immune cells to eliminate infection
viral antigen
Graphic: Andrea Love

Sterilizing Immunity Is the Exception, Not the Norm

Sterilizing immunity is the holy grail of immune protection against infection: it means that your immune system defenses are so quick, so precise, and so tailored that a virus, bacteria, or other disease-causing microorganism isn't even able to invade your cells. In other words, your body stops the infection before it even starts. You don't get infected, you don't get sick, and you can't transmit the pathogen to anyone else.

When you get vaccinated (or infected with a pathogen for the first time), your body mounts an immune response. It starts with the innate immune system and leads to the activation of your adaptive immune system and the production of antibodies: proteins that bind specific molecules on a virus (called the antigen) (Bowie and Unterholzner 2008). Some of these antibodies bind to and block the virus from even being able to enter your cells. If the virus can't enter your cells, it can't infect and replicate; therefore, the virus is neutralized.

If levels of neutralizing antibodies in your blood or mucosal tissues are high enough when you're exposed to the virus in the future, they can prevent the virus from taking hold and causing infection outright. That's sterilizing immunity.

This type of immunity is incredibly rare, because our immune responses and the pathogens it responds to are much more complex than simply [neutralizing antibodies + virus].

Neutralizing antibody levels decline over time, because it's energy-intensive for your antibody-producing cells (specialized B cells called plasma cells) to continue to make them long term. That decline is normal. Constantly churning out antibodies takes energy, and your body was never meant to do it indefinitely.

But you have a lot of other components of your immunity beyond neutralizing antibodies—and that collective response is what protects you from serious illness, even if it doesn't fully neutralize all viral particles. That's the science harnessed by vaccines.

After you're vaccinated, you don't just make neutralizing antibodies; you also develop immune memory (Pollard and Bijker 2021). This includes

memory B cells and memory T cells. Memory B cells "remember" how to make neutralizing antibodies. If you're exposed to the same virus in the future, they rapidly activate, turn into plasma cells, and produce fresh batches of neutralizing antibodies in a short period of time.

While B cells are rebuilding antibody stockpiles, T cells help control the infection from other angles. CD4 (Helper) T cells coordinate the overall response by helping to activate B cells, communicate between immune cells, and recruit them to assist exposure (Victora and Nussenzweig 2022). Cytotoxic (CD8) T cells target and kill infected cells, limiting the ability of virus to replicate and spread (Sallusto et al. 2004).

While memory immunity may not completely prevent the virus from getting into your body, this coordinate response clears infection faster, limiting the spread of a virus. This reduces viral load, which means you are often less likely to infect others. It also means less severe illness and shorter duration when you're sick. That's why vaccination matters. That's why vaccinated people have milder illness and are less likely to develop complications, require hospitalization, or die even if they get infected.

Most Vaccines Don't Generate Sterilizing Immunity, and No One Has Pretended They Do

The goal of vaccination isn't to automatically stop a pathogen at the gate; it's to train your immune system to limit damage from a pathogen by developing that memory immunity. That means individuals and collective society experience less illness, fewer complications, and improved overall health. Vaccines don't need to elicit sterilizing immunity to be incredibly effective. In fact, most vaccines do not provide sterilizing immunity. If you live in the United States in 2025, you've benefited from non-sterilizing vaccines.

Let's look at some examples.

The tetanus vaccine is a toxoid vaccine, because the symptoms of tetanus are not due to the bacterium *Clostridium tetani* itself but rather a toxin it produces. The vaccine doesn't prevent infection from the bacteria. It neutralizes the toxin, *tetanospasmin*, that causes muscle paralysis and death. Routine tetanus vaccination (including adult boosters) has nearly eliminated tetanus in the United States. The roughly thirty cases a year now are almost entirely in unvaccinated people. The bacterium is still ubiquitous in the environment. The vaccine prevents potentially fatal illness from that likely exposure.

The Hib vaccine protects against *Haemophilus influenzae B*, a bacterial infection that is the leading cause of life-threatening illnesses in children under five, including meningitis, pneumonia, and epiglottitis. It induces a very strong memory immune response but not sterilizing immunity (Gilsdorf 2021). Before the vaccine was available, Hib led to 20,000 invasive infections (severe disease progression) and 1,000 deaths in children under five in the United States every year. Today Hib incidence has been reduced by 99 percent solely due to vaccines.

The hepatitis B vaccine protects against the hepatitis B virus (HBV), transmitted through bodily fluids, including perinatally (around the time of birth), unsafe medical practices, sexual activity, and other person-to-person fluid exchange. Hepatitis B infection causes acute and chronic illness because hepatitis B virus is a DNA virus that can persist in liver cells indefinitely.

Children infected have a 90 percent risk of developing chronic hepatitis, which leads to liver damage, cirrhosis, and liver cancer. Fifty-eight percent of all liver cancers are due to hepatitis B (Institute of Medicine 2010). We protect against this now with a three-dose vaccine, starting at birth, to protect a newborn against that potential perinatal transmission when they are at high risk. This vaccine does not induce sterilizing immunity, but it does protect against illness, infection, and cancer. Hepatitis B vaccine has reduced global prevalence of chronic hepatitis B in children under five from about 5 percent in the 1980s to less than 1 percent today. Vaccination programs have reduced new infections among kids by over 95 percent in areas with high vaccine uptake.

Seasonal flu vaccines have to contend with the influenza viruses that mutate incredibly quickly thanks to their segmented genome, which makes sterilizing immunity a pipe dream. Still, flu vaccines have an incredible public health impact. They are 40–60 percent effective at preventing symptomatic illness; they reduce hospitalizations by roughly 50 percent and risk of ICU admission by 80 percent (Rondy et al. 2017; Thompson et al. 2018). In the United States, that means they prevent 7.5 million illnesses, 2–6 million medical visits, 40,000–120,000 hospitalizations, and 3,000–12,000 deaths *every year.* Flu vaccines reduce risk of death among children by 75 percent, prevent poor pregnancy outcomes such as preterm birth or stillbirth, and are associated with a 15–20 percent reduction in all-cause mortality primarily from cardiac and respiratory complications (Olson et al. 2022; Walzer et al. 2020; Chaves et al. 2023).

I could go on, but I think you get the idea.

None of these vaccines are "sterilizing," but all of them save lives. They're designed by scientific experts with biological reality in mind. That they don't prevent 100 percent of infections does not remotely mean they're "failures," but that rhetoric has been propagated by disinformation peddlers to erode trust in these life-changing medicines.

Vaccines Are Not Magical Forcefields

Vaccines are one of the most impactful developments of modern medicine, but they aren't magical forcefields. This all-or-nothing attitude doesn't exist for anything else, so why do we let it control discourse about vaccines?

Chemotherapies and immunotherapies don't guarantee cancer remission, but they dramatically improve odds and increase survival rates. Would you say, "You got cancer again, so chemo didn't work" to someone whose cancer

came back after ten years in remission?

Blood pressure medications don't prevent every stroke or heart attack, but they reduce the risk and occurrence of them dramatically.

Antibiotics don't eliminate every bacterial infection, but we acknowledge they've saved millions of lives—and we still use them, responsibly.

Seatbelts don't prevent car crashes; they prevent you from flying through the windshield if a crash occurs, reducing the likelihood of death and the severity of injuries.

Umbrellas don't prevent you from getting wet in all cases, but they prevent you from being drenched in a thunderstorm, which means they did their job.

Vaccines are no different; just like seatbelts, airbags, and other medications, they are risk mitigation measures that we know are effective. But we also know they're not *always* effective. Vaccines must be viewed in the same way.

'Sterilizing Immunity' Is a Dog Whistle Used by Anti-Vaccine Activists

Vaccines are not intended to make people invincible. They're designed to give you tools to be resilient when faced with an infectious agent. And guess what? By every credible measurement, they do that. The perception that vaccines must be 100 percent effective or they are not effective at all has been deliberately fueled by the rhetoric of Robert F. Kennedy Jr., Joseph Mercola, Del Bigtree, Peter McCullough, and many others who are destroying our health agencies from within.

Their sterilizing immunity narrative is part of a decades-long strategy to erode public health and trust in science. They demand perfection through biologically implausible expectations such as "vaccines should stop all infections." Then, with this ridiculous bar for science, they'll paint incredible success as failure (yes, the millions upon millions of lives saved with COVID-19 vaccines to them is a failure). And finally, they'll profit by selling that distrust through book deals, donations to their activist organizations, podcast agreements, and more.

This isn't holding science to a high standard; it's undermining public trust by design. Trust in science has eroded because the public has been convinced by these people, people with zero relevant expertise, to misunderstand data. We cannot let influencers co-opt scientific facts. It harms us as individuals and as a society.

Vaccines aren't broken. Our collective understanding of immunology is. And it's thanks to the very people who profit by spreading lies about vaccines. Vaccines prevent illness, reduce suffering, and save lives. That's true even if they don't prevent every infection.

The next time someone says, "But I still got sick," ask them: Did you survive? Were you hospitalized? Did your infection end in days instead of weeks? If so, congratulations! That's not vaccine failure; that's success. You lived. Science worked. ■

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Boiled Frogs and Chained Dogs: Habituation Myths

Q: **Is it true that dogs won't object if you gradually reduce their chains a little bit at a time?**

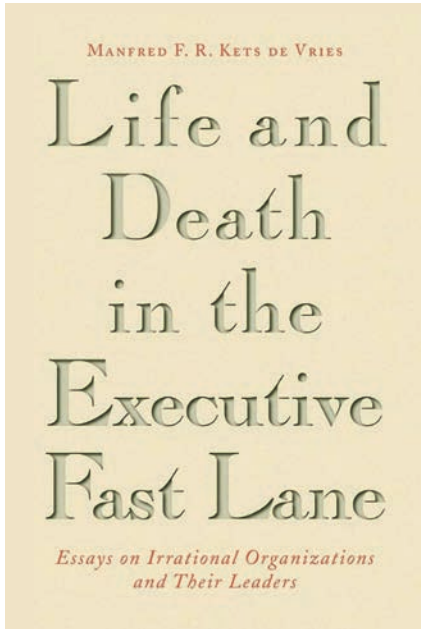
—J. Pritchett

A: The premise that dogs who would otherwise fight a shorter leash will accept it if it's done gradually is one of countless pop psychology ideas that have circulated over the years. The example offered reads, "If you reduced a dog's chain one link at a time, every few days, until his chain is so short he won't be able to move, he will never resist because he is conditioned to the loss of his freedom slowly, over time. That's what's happening to you."

This psychological process, called habituation, is a genuine phenomenon and is used, for example, in treating certain phobias via exposure therapy. It works like this: Let's say a person wants to overcome their fear of dogs, stemming perhaps from being attacked as a child. The person might avoid dogs but agree to be in the same room with a dog, as long as it's on a short leash. Once that's done a few times and no longer generates fear or concern, the person might agree to a longer leash and, over time, perhaps a free-roaming dog that has demonstrated its friendly nature. The idea is that as you become accustomed to a stimulus, you pay less attention to it, and your response thus diminishes. This technique has three key conditions: frequency (for example, how often the person sees the dog), intensity (how close the dog gets), and duration (how long the dog is nearby).

The principle is sound and well established—in specific contexts. It's also why when you put on clothing in the morning, you notice the fabric momentarily, but it very quickly becomes background; your brain recognizes that it no longer needs to devote resources to that ongoing, static, innocuous sensory input. We don't notice how our clothes feel on us unless we specifically pay attention to it. And, of course, slow, incremental changes are less likely to be noticed than sudden and large changes. For example, you're less likely to notice being shortchanged 38 cents at the grocery store every other week than $38 on one occasion or a drop in ten degrees temperature over the course of a week than over an hour.

That's all well and good, but generalizing to other contexts—and metaphors—is tricky. The message is often shared as a cautionary anecdote, in part because it's a useful rhetorical device for anyone regardless of ideology. You can make it fit any given political angle or agenda. Any social, political, cultural, or other change the author/sharer objects to can be framed as a seemingly innocuous step toward ruin. People who agree to requests or requirements to wear masks during a pandemic should think twice because it's an obvious step toward fascism. Each Halloween some fundamentalist parents refuse to let their kids dress up as witches or monsters, fearing it's a stepping stone to dabbling in the occult. Skeptics may recognize the slippery slope fallacy inherent in


Manfred F. R. Kets de Vries
Life and Death in the Executive Fast Lane
Essays on Irrational Organizations and Their Leaders

these examples, as well a large dose of conspiracy theory ("you don't recognize that this is happening to you, but I'm revealing a truth 'They' don't want you to know").

Another version, this one about frogs, is especially popular in business and management schools. Manfred Kets de Vries, author of the book *Life and Death in the Executive Fast Lane*, wrote:

> Take a pot of hot water and a frog. Throw the frog into the pot. What do you think will happen? The obvious, of course: the frog will jump out. Who likes hanging around in a pot of hot water? Now … take a pot of cold water, put the frog in it, and place

> the pot on the stove. Turn on the heat. This time something different will occur. The frog, because of the incremental change in temperature, will not notice that it is slowly being boiled. Unfortunately, many organizations, as they grow, begin to resemble the boiled frog. (Kets de Vries 1995)

James Fallows wrote a piece in the September 16, 2006, issue of *The Atlantic* titled "The Boiled-Frog Myth: Stop the Lying Now!" in which he took issue with Al Gore's Academy Award–winning documentary *An Inconvenient Truth*, an otherwise "scientifically impressive, politically important" film that "also contains one moment of pure ignoramus-hood: the perpetuation of the boiled-frog myth." In fact, Fallows was so irritated that he wrote a second *Atlantic* article on it the following year, "The Boiled-Frog Myth: Hey, Really, Knock It Off!" prompted this time by the myth repeated in *The Economist*.

Frogs and Dogs

Let's return to the examples above: regardless of their implications, are they actually true? Both involve cruelty to animals, so they would be unethical to actually test. And, in the case of the dog, whether the animal "resists" each newly shortened chain or not is subject to many variables. The lesson is also slightly different in each case; the frogs are said to be unaware of the change in temperature, while the dog is assumed to be aware of the change in conditions but nevertheless compliant or obedient.

Eminent Australian skeptic and scientist "Dr." Karl Kruszelnicki traced this myth back over a century to E.M. Scripture, who wrote the book *The New Psychology* in 1897. Scripture cited earlier German research: "A live frog can actually be boiled without a movement if the water is heated slowly enough; in one experiment the temperature was raised at the rate of 0.002°C per second, and the frog was found dead at the end of two hours without having moved." Kruszelnicki (2010) notes, "The numbers don't seem right: First, if the water boiled, that means a final temperature of 100°C. In that case, the frog would have to be put into water at 82°C … Surely, the frog would have died immediately. Second, Mr. Scripture wrote that the frog was found 'without having moved.' How do you convince a frog not to move for two hours?"

Kruszelnicki quotes Victor Hutchison, emeritus research professor from the Department of Zoology at the University of Oklahoma:

> The legend is entirely incorrect! The "critical thermal maxima" of many species of frogs have been determined by several investigators. In this procedure, the water in which a frog is submerged is heated gradually at about 2°F per minute. As the temperature of the water is gradually increased, the frog will eventually become more and more active in attempts to escape the heated water. If the container size and opening allow the frog to jump out, it will do so.

So, this example fails on multiple levels. While there may be a grain of truth in some circumstances, the most common applications of the metaphor are so riddled with slippery slope arguments that the claim is likely to be wrong. And leave the dogs and frogs alone! ■

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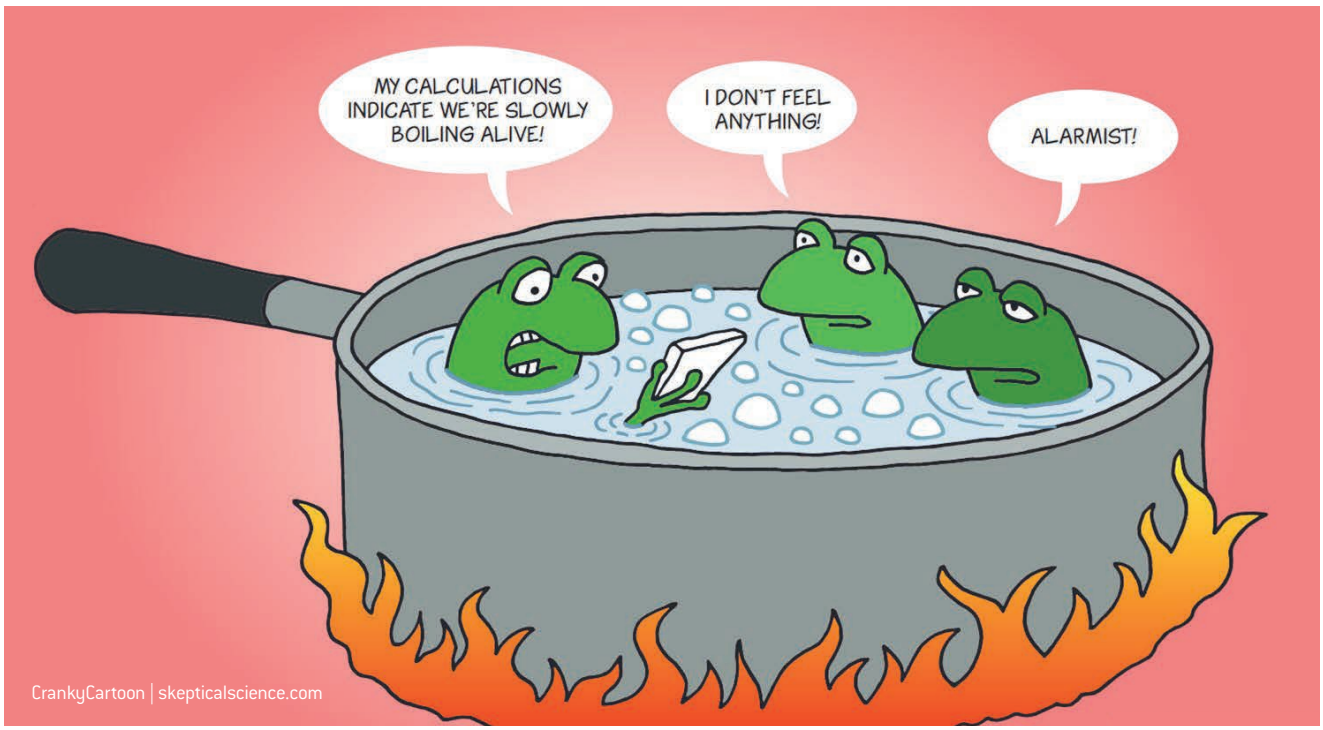

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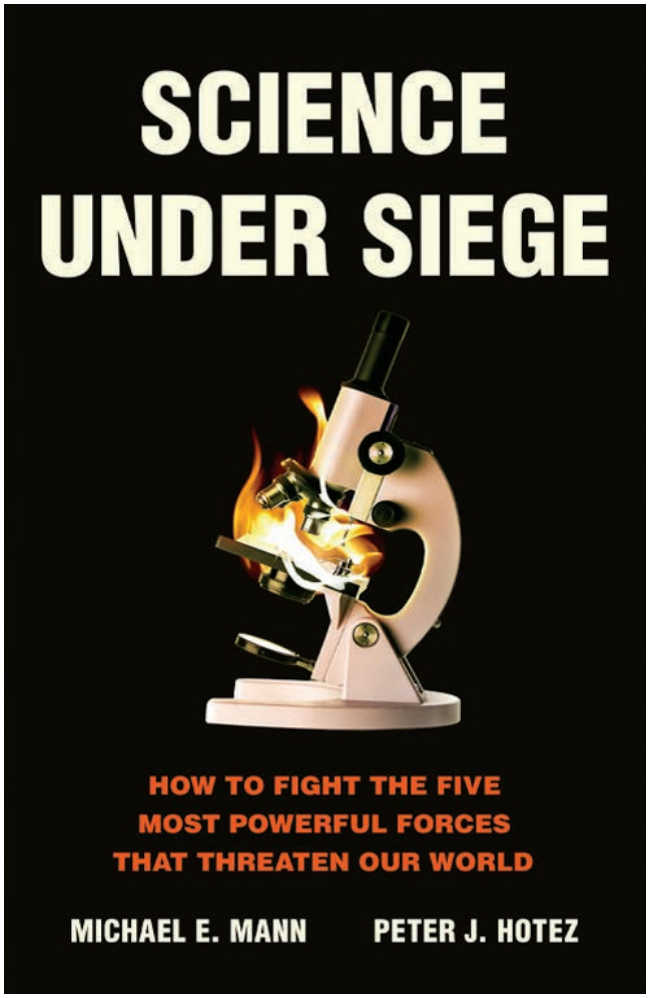
Science under Siege: The Wellness and Health Freedom Empire

MICHAEL E. MANN AND PETER J. HOTEZ

Editor's note: This article is excerpted from chapter 4, "The Pros," in the forthcoming book Science under Siege: How to Fight the Five Most Powerful Forces That Threaten Our World *by Michael E. Mann and Peter J. Hotez. We are grateful to the authors and Public Affairs, an imprint of Hachette Book Group, Inc., for letting us publish this excerpt in* Skeptical Inquirer *a couple weeks before the book is released.*



Propped up by his flawed claim of a linkage between mercury and vaccines, Robert F. Kennedy Jr. founded the World Mercury Project, which in 2018 expanded to become today's Children's Health Defense, one of the most influential antivaccine organizations there is (Weir 2021). RFK Jr. previously served as chairman and chief litigation counsel. He also promotes conspiracies and scientifically unproven theories regarding other environmental causes of chronic illnesses, including Wi-Fi and 5G radiation as causes of cancer, antidepressants, and school shootings (McDonald 2023). According to Jessica McDonald from the Penn Annenberg Public Policy Center's FactCheck.org:

> An undercurrent to many of Kennedy's science-based claims is that he is uniquely positioned to understand the science, whereas actual scientists are not. "I don't necessarily believe all the scientists, because I can read science myself," he told the New Yorker in July, just after misrepresenting the science of the COVID-19 vaccines. "That's what I do for a living. I read science critically."
>
> But time and time again, a review of the evidence contradicts Kennedy's views. He misrepresents major conclusions from papers and gets other details wrong. He conveniently ignores the scientific literature—often vast, and of higher quality—that runs counter to his beliefs. He misleads on vaccine law and misunderstands key governmental programs, consistently viewing them through a lens of conspiracy and corruption. (McDonald 2023)

An illustration of how he cherry-picks facts and factoids to produce fantasy narratives is provided by his comments about Peter [one of the authors of this book excerpt] in his 2021 book, *The Real Anthony Fauci: Bill Gates, Big Pharma, and the Global War on Democracy and Public Health*, published by his Children's Health Defense organization and Skyhorse Publishing (Kennedy Jr. 2021). In the book, he misrepresents Peter's actions, dismissing him as a "CNN television doctor" and risibly claiming he has sought to make criticism of Fauci a felony and that Fauci and Bill Gates have made some sort of secret deal to hand him millions of dollars. He has also tried to link Peter to big pharma.

Debunking RFK Jr.'s statements is straightforward. As one of the few scientists in America who had been developing coronavirus vaccines for more than a decade, Peter was a frequently invited guest on the cable news channels to discuss COVID-19 during the pandemic. Without receiving any payment for any interview, he appeared regularly on MSNBC, CNN, *PBS NewsHour*, CBS, ABC, NBC, and even Fox News. He also appeared regularly on local news outlets in Texas. RFK Jr.'s characterization of Peter as a "CNN television doctor" diminishes his role as a scientist who co-led the development of a low-cost COVID vaccine for low- and middle-income countries (LMICs; as highlighted in Chapter 1, "The 1-2-3 Punch"). His comment about Peter regarding hate-crimes protection is similarly disingenuous—Peter's actual comments were in regard to protecting professional scientists from political attacks or threats to themselves and their families (Hotez 2021).

Regarding the millions of dollars he's allegedly taken from the National Institute of Allergy and Infectious Diseases (NIAID) and the National Institutes of Health (NIH): The NIAID is one of twenty-seven research institutes and centers of the NIH and is the world's largest supporter of infectious-disease scientific research. Almost every major scientist in America who studies microbes and infectious diseases applies for research grants from the NIAID. These grants are peer-reviewed by an external advisory committee of experts who are selected from universities and research institutes across the country. The grants are then scored and ranked and are considered highly competitive. An NIH institute director typically has no role in influencing this decision. In terms of support from Bill Gates, Peter's university has indeed received previous support from the Bill & Melinda Gates Foundation to develop a hookworm-anemia vaccine (as noted in Chapter 2, "The Plutocrats"), which is now completing clinical trials. This would be an extraordinary technology for addressing disease and poverty in LMICs and would become the second parasitic-disease vaccine in clinical use after the malaria vaccine (Puchner et al. 2023). Finally, for the implication that Peter is connected with "big pharma," the reality is quite the opposite, as Peter and his team of scientists have received international acclaim for finding ways to develop vaccines without involving the multinational pharma companies (Palca 2022; Goozner 2023).

In 2023, two journalists investigated the financial support of RFK Jr.'s Children's Health Defense to uncover a complex web of finance organizations with no obvious subject-matter interest in Children's Health Defense's antivaccine mission. These included Fidelity Charitable, a 501(c)(3) public charity that donated $1 million to Children's Health Defense in 2021–2022, as well as $235,000 to Del Bigtree's Informed Consent Action Network (Bragman and Kotch 2021). Bigtree is a prominent antivaccine activist and was asked to serve as RFK Jr.'s communication director for his 2024 US presidential bid (Alfred 2024). Ultimately, Bragman and Kotch identified more than $15 million in donor-advised funds (DAFs) provided to antivaccine activist groups. DAFs can operate as pass-through organizations, allowing wealthy individuals or foundations to distribute funds quietly, or "under the radar": "DAFs are a common vehicle for funding entities like hate groups—or Covid-misinformation operations" (Bragman and Kotch 2021), and can serve as one form of what is commonly referred to as "dark money."

Next-Gen Pros

The health-freedom movement today extends beyond Joseph Mercola (Frenkel 2021), RFK Jr., and the other members of the Disinformation Dozen to include doctors associated with alternative or contrarian medical professional societies and groups. Besides the central tenets of health freedom, these organizations lean heavily on promoting spectacular cures for COVID-19 and other conditions, including ivermectin and hydroxychloroquine, despite the overwhelming evidence that these have no pharmacological benefits for COVID-19 (Bramante et al. 2022; Reis et al. 2022; Temple et al. 2021; Naggie et al. 2023; López-Medina et al. 2021), and even evidence that hydroxychloroquine itself is toxic or could become a significant cause of death during the pandemic (Pradelle et al. 2024). Among these organizations is America's Frontline Doctors (AFLD), whose website home page boasts "Protecting Your Medical Freedom," while touting itself as "the nation's premier Civil Liberties Organization." *Time* characterized it as a "right-wing anti-vaccine group that claimed the U.S. government was suppressing effective treatments, hospitals were killing COVID patients, and vaccines for the virus caused cancer" (Bergengruen 2023). According to the *Intercept*, AFLD has made millions of dollars through online consultations and hydroxychloroquine or ivermectin prescriptions. The *Intercept* states, "America's Frontline Doctors . . . is working in tandem with a small network of health care companies to sow distrust in the Covid-19 vaccine, dupe tens of thousands of people into seeking ineffective treatments for the disease, and then sell consultations and millions of dollars' worth of those medications" (Lee 2021). In a disturbing article, "What Price Was My Father's Life Worth?" interviewing Julie Moore about her father's choice to take ivermectin shipped to his home after a $90 telemedicine consultation with AFLD, *Time* writes:

> In his final days, Moore could only watch through the glass as her dad battled delirium, trying to tear off his oxygen mask in a panic. "The worst patients we've seen are the ones that delayed treatment because they were self-medicating through ivermectin," Moore says a nurse told her. "You wouldn't believe how many people we've treated who have done this." When Moore asked if any of those patients left the hospital, the nurses shook their heads no.
>
> The extent of what Moore calls her dad's "death by deception" only became clear after he died. In his office, she found emails and documents from AFLD outlining their "COVID protocol," printed out and annotated with characteristic meticulousness. "My dad was a highly intelligent man. He was a fantastic pharmacist," Moore says. "But he was also 82. They were very convincing, and they were lying." (Bergengruen 2023)

One individual with past connections to AFLD is Dr. Joseph Ladapo, the current Florida surgeon general under Governor Ron DeSantis (Bachman and Rooney 2021), who in January 2024 warned the public in Florida against taking mRNA vaccines for COVID because he claimed they could modify an individual's DNA or be linked to cancer (Florida Health 2024, Luscombe 2024). Ladapo publicly denounced mRNA vaccines as "the anti-Christ of all products" (Storobinsky 2024), an act that was widely condemned by the mainstream scientific community (Diamond et al. 2024). Peter went on several news broadcasts to provide the scientific context for understanding why Ladapo was wrong (Storobinsky 2024). So we increasingly saw during the pandemic how health-freedom propaganda took a two-fisted approach—both disparaging vaccines and promoting spectacular cures of unproven value, most notably ivermectin. In November 2023, the AFLD board chair and founder, Dr. Simone Gold, took to Twitter to place Peter on that organization's "Deadly Disinformation Dozen" list (Gold 2023)—an unimaginative and cynical effort at projection. In 2022, Dr. Gold was sentenced to a sixty-day prison term and ordered to pay a fine for storming the Capitol on January 6, 2020. She was granted a full pardon, however, by newly reelected President Trump in January 2025 (Romero 2022; Clark 2025).

Beyond AFLD, another US-based health-freedom organization that promotes the use of ivermectin is the Front Line

COVID-19 Critical Care Alliance (FLCCC), led by two founding presidents, Drs. Paul Marik and Pierre Kory, both internists and critical-care physicians. According to *STAT News* and their investigative reporters: "Ivermectin is highly lucrative for the doctors who sell it. Members of Front Line Covid-19 Critical Care Alliance and America's Frontline Doctors offer access to the drug online via telemedicine, for high fees, and often without insurance coverage Kory has launched his own 'advanced Covid-19 care center,' with a 'specialized focus' on long Covid consultations. An online appointment with a member of his team costs $1,250, which includes an initial video visit and two follow-ups, while meeting with Kory himself costs $1,650" (Goldhill 2022).

In the meantime, the FLCCC has received DAFs from Vanguard Charitable and Fidelity Charitable (Bragman and Kotch 2021). According to news reports in January 2025, the American Board of Internal Medicine revoked the board certifications of both Drs. Marik and Kory, and possibly other antivaccine physicians who promote ivermectin or other unproven treatments for COVID (Goldhill 2022; Fiore 2025; DePeau-Wilson 2025). Along similar lines is the Wellness Company, described by McGill University as "a striking example of the very lucrative libertarian medical movement that claims to stand against the profit-motivated pharmaceutical industry while replacing drugs with expensive dietary supplement" (Jarry 2023). Some of these physicians linked to such organizations make a practice of denouncing Peter on social media and media platforms. Often, the pros need to call attention to themselves and achieve this by demonizing mainstream scientists or by turning them into soft targets. Stoking the faux-outrage machine to build a base around an esprit de corps, even when it is based on pseudoscience, is another commonly used tactic. In an interesting twist, the FLCCC changed its name in January 2025 to the Independent Medical Alliance, specifying Dr. Joseph Varon as its president and chief medical officer. Dr. Varon is a Houston-area critical-care physician and someone Peter has known and interacted with, maintaining a friendly and collegial relationship, during the COVID pandemic. Possibly, it is a positive sign. One can hope, anyway.

The Brownstone Institute is yet another dark money–funded (Bragman 2023a; Bragman 2023b; Nattrass 2023; Gorski 2022) antiscience organization that generates health-freedom disinformation. It has been described as a "shadowy dark money group that has been waging information warfare on public health efforts to tackle the COVID-19 pandemic" whose founder and president (as previous editorial director of the American Institute of Economic Research) has worked closely with the Great Barrington Declaration coauthors (Bragman 2023a). Dr. David Gorski, a cancer surgeon and physician-scientist at Wayne State University's medical school, has reported on their litany of all too familiar antivaccine conspiracies and about COVID origins and their touting of unproven cures (Gorski 2024; Nattrass 2023; Bragman 2023b). On its website the Brownstone Institute lists the Independent Medical Alliance as one of the "Friends of Brownstone," along with the *Epoch Times*, a far-right newspaper linked to the Falun Gong new religious movement (Brownstone Institute n.d.). Their rhetoric is highly conspiratorial in nature, "suggesting that information about [vaccine] side-effects was being suppressed" (Nattrass 2023), while posting articles on its website such as "Conspiracy Theorists Were Right About Climate Lockdowns" and "Contaminated: We've Been Their Lab Rats All Along."

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There is a persistent trend of antivaccine activism and COVID misinformation that is linked to the lucrative health-freedom, wellness, and nutritional-supplement industry with historical ties that go back to early America. The movement taps into something much older and more ingrained in the American psyche, but has evolved from the time of Samuel Thomson to become a sophisticated network of shadowy or dark-money groups that promote antivaccine conspiracies and magical or unproven cures and treatments for COVID-19.

The prescient 2011 film *Contagion* imagined a chillingly COVID-like global outbreak, involving a novel zoonotic respiratory virus spread through multiple spillover events from bats to pigs and then to humans. Public health experts work against the clock to develop a vaccine for the virus, which threatens to kill hundreds of millions of people around the world. The key antagonist is antiscience conspiracy theorist and blogger Alan Krumwiede, who profits from the online sale of bogus homeopathic cures derived from forsythia, which he falsely claims to have used to cure himself of the virus. Hordes of people seeking forsythia swarm and overwhelm the pharmacies. The lead protagonist, meanwhile, is CDC scientist Dr. Ally Hextall, who develops a successful vaccine and saves the day.

Today's antivax pros (with considerable help from our media, as we'll learn in Chapter 6, "The Press") have managed to perversely flip this script, making public health scientists like Tony Fauci and Peter the villains, while presenting themselves as the heroes. They include members of the Disinformation Dozen and groups such as AFLD and FLCCC, with the Brownstone Institute providing them with quasi-academic and think-tank covers. Social science research has shown the outsize ability of physicians and other credentialed experts to damage public health owing to the trust the public has placed in them. What furthers the damage today is the way the pros are able to make public health misinformation go viral, if you'll forgive the pun, in the era of social media (Harris et al. 2024). The flow of dark money, including DAFs, is a pernicious new ingredient as well. Walker Bragman and his colleague Alex Kotch deserve enormous credit for tracking the dark-money transfers. One important way to reduce the influence and spread of disinformation by the pros is to better regulate DAFs, demand greater transparency, or, ideally, halt the flow of funds to organizations committed to damaging public health or attacking scientists. However, as Bragman and Kotch point out: "Cutting off the funding spigot could help … but doing so is no easy task. Although DAF sponsors have full legal control over the funds they distribute, getting them to stop funding anti-vaccine and anti-public health organizations may prove difficult" (Bragman and Kotch 2021). ■

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NIH Funding Cuts Hurt Basic Research and Patients

DAN WILSON

Breakthroughs in medicine that transform patients' lives for the better depend on adequately funding basic research, the kind of research that aims to understand how things work. This funding is provided largely by the National Institutes of Health (NIH), with other global funding sources for health research not even coming close (Gaind 2025). As of this writing, the current administration proposes a 44 percent cut to NIH funding in the 2026 fiscal year. If these cuts happen and continue in following years, they will both slow scientific progress and directly hurt patients.

Millions of people suffer from illnesses that are poorly understood. Answering fundamental questions about how our cells and the biological world around us work gets us closer to treating and even curing these diseases. Oftentimes, the connection between basic discoveries and practical cures is not readily apparent to most people and is not spotlighted well in traditional media sources.

Take, for example, a baby at the Children's Hospital of Philadelphia who was, so far as we can tell, recently cured of a rare genetic disease using personalized CRISPR technology ("World's First Patient" 2025). Normally, patients with this disease, CSP1 deficiency, need constant curation of their diet and usually end up needing a liver transplant. Now, thanks to technology capable of correcting errors in a living person's DNA, this baby will not have to suffer and will likely live a long life. What field of study do we have to credit for making the discovery and eventual use of CRISPR technology in this way possible? The study of how bacteria defend themselves against viruses. Sounds like a pretty unassuming venture, right? Yet it is this kind of exploratory work that leads to breakthroughs in unpredictable ways, and this work was funded largely by the NIH.

Cutting the NIH's ability to fund biomedical research—done by scientists exploring questions that few others even know are being asked—means that we will see less of this in the future. This recent example is a historical first, where a baby's DNA was changed to treat a genetic disease after being born. This opens possibilities of addressing other genetic disorders in the same way. Diseases such as cystic fibrosis, progeria, Huntington's disease, type 1 diabetes, and many more could be next, but the work needs to continue and be supported financially. I recognize, however, that even this example may not hit close to home for most people. Most people do not have genetic diseases, and people will often be more willing to fund issues that they are more likely to see in themselves or their families. While this breakthrough is historic and has given invaluable new life to a baby, convincing people that science funding is important means telling stories like this that can apply more to the average person.

grandbrothers | Shutterstock

So, what if I told you that work funded by the NIH has led to a cancer cure? A cure for a type of cancer, that is. That cancer is chronic myelogenous leukemia (CML), and that cure is a targeted therapy called Imatinib (brand name Gleevec). In 1996, physician-scientist Dr. Brian Druker and his team published preclinical results showing that their small-molecule inhibitor could stop CML cancer cells in their tracks. This work, funded by the NIH (Druker 2025), would be the start of a revolutionary new approach to cancer treatments and save thousands of lives from an otherwise bleak and painful disease. The work funded efforts to understand the structure and function of the unique mutated enzyme that is the culprit of most CML cases. Researchers realized they might be able to design a drug that specifically targets this mutated enzyme while leaving normal ones alone. It ended up working better than anyone expected.

In the years leading up to this publication, Druker had experienced heartbreaking stories that would be familiar to anyone who has closely dealt with a loved one dying of can-

cer—from painful bone biopsies resulting in less than hopeful news to watching helplessly as lives full of potential were cut short. Druker, like most doctors, wanted desperately to be able to offer something better to his patients. For these patients, that came in the form of those preclinical results of Gleevec progressing to show outstanding success in clinical trials. How much success? Well, before Gleevec the average CML patient could expect to die within two to three years of their diagnosis. With Gleevec, the average CML patient can be expected to live a normal lifespan (Gambacorti-Passerini and Piazza 2015). A normal lifespan after a cancer diagnosis is effectively a cure! And we have NIH-funded work done by brilliant and motivated scientists to thank. Shouldn't our leaders want more of this?

While Gleevec is one of my personal favorite science success stories, the stories don't stop there. Over the past sixty years (or so), breast cancer survival rates have tripled (Breast Cancer Survival 2010) thanks to focused funding efforts by the NIH and other institutions that have strengthened our understanding of how best to detect and treat breast cancer. Five-year survival rates for men with local and regional prostate cancer are up from 69 percent in the 1970s to 100 percent today (Brawley 2012). About 80 percent of children with cancer today go on to live full lives (Ossola 2015). This is because we cared enough about these issues to fund the efforts of the scientists and doctors trying to find solutions.

The NIH is by far the largest funding source for biomedical research in the world, which has made the United States a leader in medical research for decades. By proposing sweeping cuts, we are essentially saying that we do not care as much about disease, be it chronic, infectious, or genetic. If we choose not to invest in the basic research necessary to achieve life-changing breakthroughs, then the breakthroughs will slow and may even stop. At least, they won't come from the United States anymore, and it will take time for other nations to build comparable biomedical research infrastructures. The inevitable result of all this is that more patients will suffer in ways that we could have prevented. If suffering can be prevented, we ought to do so to the best of our ability. What greater goal can science serve? ■

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Dan Wilson earned his PhD in biological sciences from Carnegie Mellon University. He currently works as a scientist in industry and spends some of his free time debunking vaccine and medical misinformation on YouTube with his channel, *Debunk the Funk with Dr. Wilson*.

Brain Drain: A Consequence of Attacking Science

KATIE SULETA

The current assault on science, research, and academia is calculated. Pulling federal funding from universities, labs, and entire agencies may allow the Trump Administration to claim they are "saving money," but it also has another side effect that I suspect is the real reason: scientists, researchers, and academics are arbiters of truth and reality, and if you can remove them then you can control what you want reality to be.

The strategy has been to defund and then attack in the media. These attacks extend beyond the people currently or recently employed in these professions. It also directly cuts off the pipeline of scientists in training. This is no longer just a problem for the people who lost their jobs from the government layoffs; this is now a problem of not having enough scientists in the future.

Most people know that grants fund research, but grants fund more than experiments; they also fund people. For example, in the health sciences when people are accepted into a PhD program, the acceptance is often tied to grant funding. Labs are regularly funded through federal dollars, and openings for new PhD students occur when someone from the lab graduates, allowing the financial support to be shifted to a new student. The grant has a certain amount of money allocated for personnel, including graduate students. The grant then covers tuition and a stipend for the student as they work to advance both their education and the work of the lab.

With the gutting of Health and Human Services grants, for example, many labs had to shut down. People lost their jobs. Graduate students lost their spots in laboratories and therefore the funding for their education. And future graduate students lost their opportunity to even start their training.

The unending barrage of extremely newsworthy events this year included a slew of stories about universities rescinding offers to PhD students (Graduate Reductions across Biomedical Sciences 2025; Information for Fall 2025 PhD Applicants 2025; Chitirala and Ryan 2025). Those federal funding cuts directly killed research but also the pipeline of future researchers. All those would-be graduate students are now faced with the decision of what to do next. So, what are their options?

Some of those aspiring researchers will instead attempt to enter the workforce. All will have college degrees; some may even have a master's degree. However, they will be entering at a different position than they had originally planned for. They will likely not be qualified for the jobs they had originally identified as their goal. While people can adapt and attempt to be flexible in the types of jobs they seek, the market will be less flexible.

There are only so many jobs available for people within specific fields. With an unexpected influx of people, jobs will be more competitive. These aspiring researchers will be competing with the typical pool of applicants but also with a pool they never anticipated: former government workers. People with years of experience and potentially more education will also be flooding the workforce attempting to find any job they can. This will make getting a foot in the door even harder than it already is for those just starting their careers. This may naturally lead some to wonder about opportunities outside the United States.

Many Americans will seek education and employment abroad. Now that the United States is hostile to specific types of education, such as health sciences research, opportunities to go into those fields may soon be better in other countries. For those students looking to pursue an education and future career in those areas that the United States has gutted, going abroad may be the only option—and the world is noticing. For example, in May 2025, France and the European Union announced intentions to make it easier for American researchers to settle in Europe. According to *The Guardian*:

> [French president] Macron's office said the move comes "at a time when academic freedoms face a number … of threats" and when Europe "is an attractive continent." [A representative from Macron's office] said: "We are a space where there is freedom of research and no taboo topics." France is thought to be particularly keen to attract scientists working on health—particularly infectious diseases—as well as climate research and artificial intelligence. (Chrisafis 2025)

The number of American scientists expressing interest in going abroad should concern everyone. We are not only losing the established professionals but also those in training and those who want to be in training. "We are witnessing a new brain drain," said Éric Berton, president of Aix-Marseille Université in France. "We will do everything in our power to help as many scientists as possible continue their research" (Duster 2025).

We could also see college and graduate students begin to seek educational opportunities abroad. For example, study abroad programs are traditionally for a specific amount of time (e.g., a semester) where American students can go study in another country. According to Open Door, during the 2022–2023 academic year, about 280,000 American stu-

dents went abroad (U.S. Study Abroad n.d.). Although these programs are specifically designed to be temporary, many students may now be motivated to stay in the country for longer than originally planned. Some may even settle in the host country permanently. While that may not be as common, it does happen. With the United States government's active hostility toward certain types of professions, the number permanently settling in other countries may increase.

With few students graduating from universities in America, companies and organizations will likely be forced to make changes to their hiring practices. How will they adapt?

Many companies will seek highly skilled workers from other countries. It's not uncommon for an organization to sponsor a visa for a highly skilled worker from another country. An H-1B visa "allows employers to petition for highly educated foreign professionals to work in 'specialty occupations' that require at least a bachelor's degree or the equivalent. Jobs in fields such as mathematics, engineering, technology, and medical sciences often qualify"(The H-1B Visa Program and Its Impact on the U.S. Economy 2016).

Originally created in 1990, Congress puts a cap on the number of H-1B visas available every year. Sponsoring institutions must demonstrate their need for a sponsored worker by filing a labor condition application and informing other employees of their intent to hire an H-1B visa role. It's a lengthy process that involves lawyers and lots of paperwork, so while common, it's not a process that happens every day in most organizations.

However, if the number of highly skilled and specialized Americans drops, this practice may become necessarily more common. While Congress puts the cap on the number of H-1B visas annually available, that cap may need to rise in the coming years due to lack of sufficiently trained American workers.

For those worried about immigration and the threat posed to American jobs, gutting scientific funding directly impacts this. Positions that either used to be filled by Americans or would be filled by Americans now won't be due to the shortage of highly skilled workers. If we aren't funding new scientists, researchers, and the like to be trained through these grants, then we will have to import talent and skill.

The only other choice for companies is much bleaker. If we don't import new talent and skilled workers, yet still have a deficit, the only other option is for organizations to stop conducting research. This is a particularly scary scenario; organizations, agencies, and companies that cannot find people with the right training may just stop doing research altogether. This not only stifles scientific research and advancement, but it also gives up our seat as the powerhouse of biomedical and health sciences development in the world.

We will, willingly, cede our place as a world leader to someone else (e.g., China). Companies will export even more jobs and maybe their entire enterprise outside of the United States. Yes, this may be a doomsday scenario, but it's not outside the realm of possibility. It's important to entertain the logical conclusion of these research funding–gutting policies because they will have far reaching downstream effects.

Policies have consequences. The dominance of science and research in our culture demands attention. The departure of highly skilled American workers, coupled with a lack of new talent, jeopardizes our standing as a global leader in biomedical and health sciences education and research. This trend has already led to job losses and threatens to diminish research endeavors, presenting a bleak future for aspiring American scientists and the nation.

To save our future, we must save funding for science. We must invest, not divest, in our people and scientific education. We must fight these cuts and fight the demonization of science. Our society depends on it. ■

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We Must Stand Up for Science

BILL NYE

Editor's note: Bill Nye gave the following speech on March 7, 2025, as part of the Stand Up for Science rally held on the steps of the Lincoln Memorial in Washington, D.C.

Hello, Washington! It is so good to see you all. Greetings, greetings, greetings. Thanks for joining us today. We are gathered to insist that our lawmakers stand up for science. The framers of the U.S. Constitution made sure to include Article I, section 8, clause 8, "Congress is to promote the progress of science and useful arts." Useful arts would be an eighteenth-century expression for what nowadays we would call engineering—using science to solve problems and make things. These constitutional ideas have helped make this country great, a world leader in innovation as well as in the rule of law. The process of science, along with our hard-won scientific body of knowledge, enabled us to feed and care for the world's billions, build great cities, cure diseases, create global transportation and communication systems, and even know our place among the stars.

My friends, science is part of the American story. If the United States is to lead the world, science cannot be suppressed. And so today, my friends, we demand that scientists not be censored. That there be legal safeguards to prevent political interference in their research, and that they be enabled to communicate their findings freely. Furthermore, we demand that all of us, the public, have access to scientific information—all the data, reports, and resources that were available before this president swore to uphold the U.S. Constitution in January of this year. This is our right. We paid for this science with our tax dollars.

As we stand here today, certain elements of our own government have suppressed references to climate change, have advocated against lifesaving vaccines, and have ordered an automatic review of papers for the purpose of censorship. Papers that include certain words, such as *female*.

Over there, my friends, is the U.S. Capitol. To the other side—the side restricting access to scientific reports, scientific data, and resources—we ask, what are you afraid of? What is it about the process of science, modern medicine, caring for our neighbors, or women's history month that you all find so scary?

My friends, science is in the national interest. Censoring science is not. I encourage those on the other side to break ranks, become leaders, oppose this suppression of science. The founders embraced the idea that by promoting science and engineering, our citizens would be free to do research and to innovate, which would in turn stimulate the economy, help us compete on the world stage, and keep us safe, ultimately improving the lives of all of us. Every citizen, each of us, wants a better future for ourselves and for our families. Together we can, and we must, stand up for science. Thank you. Let's change the world! ■

Bill Nye is a CSI fellow and science communicator. He was awarded the Presidential Medal of Freedom in January 2025.

ScienceSaves: Celebrate the Power of Science

Watch the winning ScienceSaves videos here!

BERTHA VAZQUEZ

As director of ScienceSaves—CFI's campaign to promote appreciation for the role of science in our lives—I've had the incredible privilege of watching the entries for this year's scholarship contest, in which high school seniors create thirty-second videos to answer the question: "What has science done for me or someone I know?" Watching the 451 entries we received this year may seem like an arduous task, but I enjoyed every second.

Each powerful story shared by this year's applicants is a moving reminder of how science touches lives and how our fellow humans make the world better. These students have faced extraordinary challenges with courage, resilience, and gratitude, and they've shown us how scientific breakthroughs can mean the difference between despair and hope, between loss and life. This scholarship is made possible through the generosity of Todd Stiefel, founder and president of the Stiefel Freethought Foundation, whose commitment to promoting science and humanism continues to change lives.

It's an honor to introduce you to the *actual transcripts* from the top videos, which not only highlight the impact of science but also the strength of the human spirit. Thank you to each of the 451 students who created these videos and the people who inspired them. And thank you for watching—and for believing, as we do, that science truly saves.

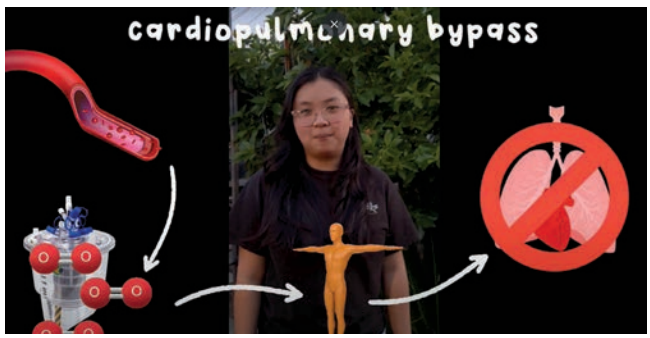
A still from Jacqueline Held's winning scholarship video in 2025.

Jacqueline Held – First Place ($10,000)

My grandmother needed a year and a half of chemotherapy to treat her breast cancer. My mother needed a double mastectomy to treat hers. The reason they were able to get different treatments is because of Charles Perou, who classified breast cancer as a collection of diseases based on different patterns of genes, allowing different treatment to be given to different types of breast cancer. If my grandmother hadn't been treated with chemotherapy, it is incredibly likely that the cancer would have killed her. Whereas if my mom was given chemotherapy, it would've caused more health issues. Science has saved both their lives—and it's the reason I'm able to be with them today.

Annie Vo – Second Place ($2,000)

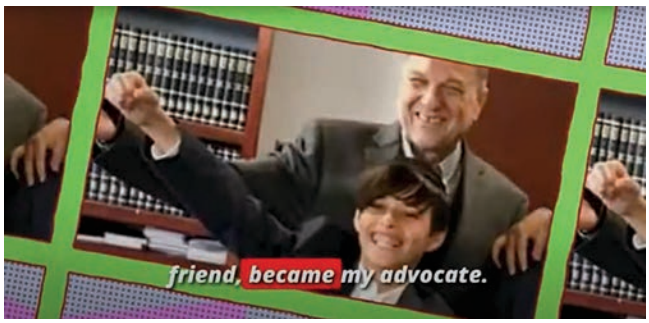
I've held my sister's heart in my hands. She was eighteen when she had a heart transplant. Cardiopulmonary bypass hooks blood vessels into tubes that move the blood that would flow into the heart and lungs into a reservoir, where it is oxygenated before cycling back into the body, avoiding the cardiopulmonary system. This allows doctors and surgeons to replace her heart with a donor one. Her scar is a testament to the technology that has allowed her to be here today—and has also allowed my best friend to be here. So thank you, science, for "saving me," [Annie's sister says as she enters the video].



Itai Hershko – Third Place ($1,000)

Growing up with sensory processing disorder, the world often felt too loud, too bright, and too much. My grandfather—my best friend—became my advocate. He researched therapies and medicines and worked alongside me every day, using

science to help me make sense of a chaotic world. When his heart failed and doctors gave him hours to live, science stepped in again. Emergency cardiac stents reopened blocked arteries that kept his heart beating. Science saves more than lives—it creates ripples of change.



Kaun Kulamavalavan – People's Choice Award ($1,000)

I grew up in Montego Bay, Jamaica, but then I moved to Massachusetts and then I moved to New York. I missed the marine life in Jamaica and wanted a way to connect back to my roots. Sixty-three acres of seagrass die every day. I emailed researchers until I landed a position at the Marine Biology Laboratory in Cape Cod. I led a study that aimed to find the gene responsible for thermal tolerance in seagrass. I discovered that HSB70 is responsible for increasing thermal tolerance within seagrass. My results will be used to assist in genetic modification for large-scale restoration. My research has helped me reconnect with my childhood and make a difference in the future of marine restoration. #ScienceSaves.

Lorraine Niaba – Honorable Mention ($250)

My name is Lorraine Niaba, and science is my spark for global change. At Harvard Medical School, I designed ultra-rapid assays to diagnose brain cancer mutations in elderly patients, employing science in the battle against cancer. And with cerebral palsy care facilities across the world, I programmed a digital art platform and a custom-built supportive device to allow those with limited hand mobility to share their testimonies. Through brain tumor research and creativity in self-expression, science saves.

Amy Key – Honorable Mention ($250)

When I was diagnosed with autoimmune hepatitis, a chronic liver disease, in ninth grade, science saved my life—because scientists discovered that azathioprine and prednisone were effective treatments. I'm still here, but science didn't just heal me—it inspired me. It led me to develop an app to help diagnose and track Parkinson's disease. It pushed me to join the Big Data for Health Equity Collaborative, where we researched how social factors affect health outcomes. Science gave me a second chance—and a purpose to help others get theirs, too.

Zoe Lazar – Honorable Mention ($250)

In September 2023, a CT scan revealed thirty-two tumors in my dad's neck, leading to a stage 4 cancer diagnosis. He underwent thirty-six rounds of radiation and six sessions of cisplatin chemotherapy, which targeted cancer DNA and triggered programmed cell death. Advances in treatment made survival possible. Science did not just save his life, it saved his infectious smile, his strength, his future, and ultimately, gave me my dad back.

Winni Zheng – Honorable Mention ($250)

She couldn't eat, sleep, or even recognize herself—she even thought about death. But science gave my friend hope again. Psychology explained how grief disrupts neurotransmitters, making it hard to feel joy. Therapy, grounded in cognitive science, reframed her thoughts. Antidepressants, which block the reuptake of serotonin, improved her mood. Science gave her a path back to herself. Science saves—not just her, but also everyone.

Makai Bates – Honorable Mention ($250)

Despite living with a rare genetic disorder, RHOBTB2, my brother is full of life and charisma. Last November, a prolonged seizure left him with left-sided hemiparesis. As a nonverbal child, MRIs and CT scans crucially revealed brain swelling and cerebellar atrophy and guided the emergency surgeries that saved his life. Thanks to decompressive craniectomy, EVD, ICP monitoring, intubation, and modern anesthesia, my brother survived. Because of medical breakthroughs, my brother—and his smile—are with us today. #ScienceSaves. ■

Stiefel Freethought Foundation

ScienceSaves®

Bertha Vazquez is the director of education for the Center for Inquiry. Her latest book is *What Teachers Want to Know about Teaching Climate Change: An Educator's Guide to Nurturing Hope and Resilience.*

How to Teach Evolution 100 Years after the Scopes Monkey Trial

Even a century after a high school teacher was found guilty of teaching human evolution, most of today's teachers struggle to consistently follow education standards related to evolution. Consider the following strategies for teaching evolution to learners who believe in creationism.

FORREST VALKAI

In January 2011, Penn State political scientists Michael Berkman and Eric Plutzer released the shocking results of their research into how public high school biology teachers across America taught evolution.

Their analysis revealed a "cycle of ignorance" in which the anti-evolution beliefs and attitudes of communities are perpetuated and reinforced by educators within those communities. Specifically, Berkman and Plutzer found that only about 28 percent of teachers surveyed were consistently following National Research Council education standards in effect at the time by accurately teaching the evidence of evolution and using it as a theme to unify diverse biological ideas. Conversely, 13 percent were found to be explicitly teaching creationism or intelligent design (which is just creationism in a lab coat) with at least one hour of class time dedicated to presenting it positively. (That's not counting the 5 percent who reported endorsing creationism in passing or in response to questions from students.) The remaining teachers, named "The Cautious 60%," refused to advocate for or against evolution, often because they hadn't studied evolution, lacked confidence in defending it, or simply feared the potential backlash of standing up for science (Berkman and Plutzer 2011).

Consider this situation in regard to any other topic in science. Imagine sending your child into a geology class knowing there was only a 28 percent chance they would be taught that Earth is a sphere, a 13 percent chance they would be taught it was flat, and a 60 percent chance their instructor would consider the topic too controversial to discuss at all.

Today, we can see this worrisome trend in education borne out as only 32 percent of American adults believe that humans evolved over time due to natural processes, 24 percent believe that a supreme being guided evolution for the purpose of creating humans, and 33 percent reject evolution entirely (Public's Views 2013). One hundred years after the Scopes "Monkey" Trial brought the evidence for evolution into public discussion; fifty-eight years after the repeal of the Butler Act, which made it illegal to teach evolution in Tennessee; and twenty years after the *Kitzmiller v. Dover* trial demonstrated that intelligent design was unsuitable for science class, you'd assume we had this whole "teaching evolution" thing sorted out.

I hate to be the bearer of bad news, but we've still got a lot of work to do.

Clarence Darrow (left), John Scopes's defense lawyer, and William Jennings Bryan (right), part of the prosecution team.

For over a decade, I've been teaching evolution to people who often don't want to hear about it. I started as an outreach STEM educator, visiting schools and libraries to deliver lessons and presentations about science. I then took my work online to reach a much wider audience on YouTube and TikTok. As I grew as an educator and a content creator, I was increasingly bombarded by a relentless barrage of creationist arguments, counterarguments, complaints, and misconceptions.

In my efforts to become a better teacher, I dove headfirst into these arguments, consuming far more creationist media than anyone ever should. Over time, I began to notice distinct patterns and themes that came up with worrisome regularity. It's very likely that you've heard many of the most common talking points as well. After all, how often have any of us had to endure hearing about the distinction between so-called "kinds," the unimaginative confusion of "irreducible complexity," the supposedly impossible relationship between humans and bananas, the "clearly coded" information within our DNA, or the frustratingly persistent existence of nonhu-

man-evolving monkeys as if they were new and groundbreaking challenges to our theory? (And it is "just a theory," right?)

As an educator, I keep a mental record of these patterned paralogisms, refining each subsequent lesson to simultaneously preempt common misconceptions and address frequent questions before they arise. In doing so, I've developed strategies for teaching evolution in ways that circumnavigate the ideological filters imposed by the parents, preachers, or PragerU subscriptions of the creationists in my audience, giving them a better chance of actually hearing what I'm saying, rather than simply thinking of their next rebuttal. In this article, I will share four of those strategies so you can be as effective as possible when you sally forth onto the internet to correct all inaccuracies like some sort of nerdy Don Quixote (which is literally my job).

Strategy 1: Memorize the Meaning

We'll begin with the easiest and most robust strategy: learn the definition of the word *evolution*.

In my experience, most creationist arguments center around a fundamental misunderstanding of what evolution is and how it works. We see this quite often in popular creationist media, where evolution is painted not just as the proposed explanation for the diversity of life but the origin of life, the origin of the planet, or even the origin of the universe itself, conflating these diverse and profound concepts into a single boogeyman that is quite easy to dismiss due to the (admitted) lack of evidence that random mutations can form a planet.

This is why, if you can simply memorize and understand the textbook definition of evolution—any change in the heritable traits of a population over the course of multiple generations—you can easily dispel this and many other creationist misconceptions. See Table 1 (next page) for responses to common misconceptions.

The point of all this is if you want to teach evolution, understanding the definition of the word allows you to correct many common misconceptions, and that is half the battle.

Strategy 2: Deviate from Dogma

The second, and possibly most critical, thing to keep in mind when teaching evolution is to deviate from dogma. Many creationists are accustomed to the simplified and unquestionable answers provided by dogmatic thinking. This makes them incredibly uncomfortable with the fuzzy, complicated, multidimensional answers that science often provides. The idea of humans being the "goal" of evolutionary change is a lot easier to understand (and a lot easier to dismiss) than the concept of different selection pressures acting on different populations to produce vastly different species, none of which are "more evolved" than any others. Why put in the work to understand the many factors at play in the extinction of the dinosaurs and keep up with the decades of work put in by scores of scientists around the world to solve a massive puzzle one tiny piece at a time when "global flood" explains it all in just two simple, incontrovertible words?

More importantly, dogmatic thinking means that when scientists are honest—when we admit our mistakes, acknowledge our limits, and change our minds—creationists often mistake our integrity for untrustworthiness.

You see this played out in two major ways: The first is the common tactic of pointing to times in which "the story" of evolution has changed as an example of its inherent unreliability. It's easy to find a dozen examples of creationist media pointing out that "Scientists used to believe that the appendix/tonsils/whale pelvis/etc. was a vestigial structure but have since learned more about its function and have thus shown themselves to be fallible, while the word of [insert deity here] never changes!"

For this reason, if you hope to teach evolution to a creationist, it's imperative to help them understand the scientific method itself, why theories change, and, more often than not, what the word *theory* means in the first place.

Another way in which we see dogmatic thinking clashing with science is in the frustratingly common practice of *quote mining*. If one is accustomed to dogmatic thinking, they will treat science as dogma as well, assuming that, to tear down our evolutionary belief system, all they need to do is tear down one of our great prophets. This is why you will often see creationist media supplant any attempt at a scientific argument with a simple quote from a famous biologist seemingly admitting that the science they've dedicated their life to isn't real.

Consider this popular quote from Charles Darwin himself: "To suppose that the eye … could have been formed by natural selection, seems, I freely confess, absurd in the highest possible degree."

If I got paid every time a creationist recited this to me as if the words were kryptonite, I would never have to work again.

Whenever a creationist gives me a quote like this, I have a strategy that I like to employ: Step one is to find the source of the quote. In this case, it's from Darwin's seminal text *On the Origin of Species*. Then, step two is to read the next sentence:

> To suppose that the eye, with all its inimitable contrivances for adjusting the focus to different distances, for admitting different amounts of light, and for the correction of spherical and chromatic aberration, could have been formed by natural selection, seems, I freely confess, absurd in the highest possible degree. *Yet reason tells me that if numerous gradations from a perfect and complex eye to one very imperfect and simple, each grade being useful to its possessor, can be shown to exist; if further, the eye does vary ever so slightly, and the variations be inherited, which is certainly the case; and if any variation or modification in the organ be ever useful to an animal under changing conditions of life, then the difficulty of believing that a perfect and complex eye could be formed by natural selection, though insuperable by our imagination, can hardly be considered real.* (Darwin 1859, emphasis added)

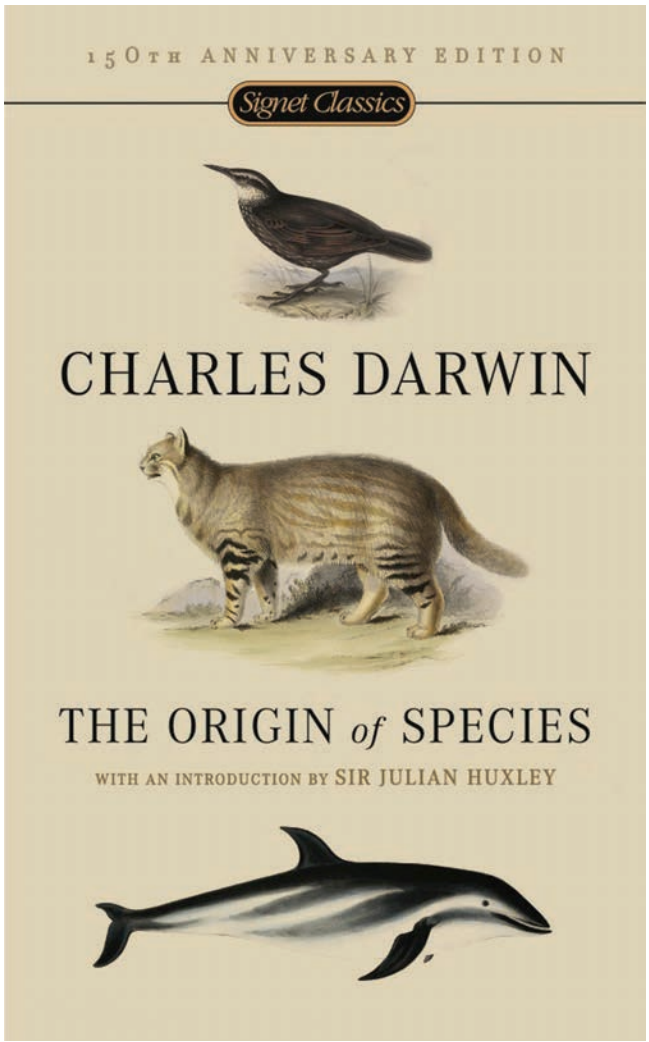
He didn't say "I agree that this is crazy." He said, "I recognize that this sounds crazy at first, but the evidence is so clear you can't possibly be serious when you say it's hard to believe."

Another quote that gets thrown around (in fact, it's probably my favorite) comes from famed evolutionary biologist Stephen Jay Gould, who reportedly says, "The fossil record includes no transitional forms."

Yikes. That's pretty serious. Fortunately, when we apply the same strategy, it seems a lot more reasonable. In this case, the quote comes from an article Gould wrote back in 1981

Table 1: Common Misconceptions and Simple Responses

"Why don't we ever see a dog give birth to a non-dog?"	Because that would be a major change in one generation rather than a bunch of changes over a bunch of generations. That's simply not how speciation works. We're just talking about a change in heritable characteristics—which, by the way, you can clearly see between different breeds of dogs.
"That's adaptation, not evolution."	Adaptation is to evolution what the angular momentum of a wheel is to driving a car. They are inseparable concepts because adaptation is a function of the change in heritable characteristics that we're talking about.
"Why hasn't my cat evolved into a human yet?"	Because your cat is an individual, not a population, and it's only alive for one generation, not several. Also, evolution isn't a ladder; it doesn't have a goal. There are no environmental pressures driving housecats to be more ape-like in any way. Evolution is just about change.
"That change is just random mutation, and mutations are always harmful."	That's fundamentally untrue. Not only does it assume that anyone's DNA was, at one point, "perfect" and modern generations are now deviating from that perfection (which makes no sense), but, more importantly, whether mutations are harmful or helpful is contextual. When you gain fitness in one environment, you necessarily lose fitness in another environment. The jaguar with the best genes for living in the jungle will still die in a coral reef.
"DNA still has to be perfect for each organism. That's what evolution is about."	Evolution is not some intelligent agent reading and judging your DNA. Not all your DNA is expressed all the time, and some of it is never expressed at all. Also, "heritable characteristics" could also include things such as epigenetic information, gene regulatory networks, developmental pathways, microbiota, and more, all of which could affect your phenotype. That's why it's your phenotype, not your genotype, that's being selected for—because it's your physical body, not your DNA, that's interacting with your environment.
"But if evolution is all about survival, then why do we age? Why do we get cancer? Why can't we breathe underwater?"	That's because evolution isn't about "survival of the fittest"; it's about reproduction of the okayest. There is no "perfect" organism, and there is no "peak" of evolution. All that matters is differential reproduction rates that, over time, change the frequency of certain heritable characteristics within a population.
"All we see is changes within kinds. Microevolution may be real, but macroevolution is not."	If you can understand how to walk ten feet, you shouldn't struggle with the concept of walking a mile, especially considering how rapidly things such as developmental changes can alter the phenotype of an organism. Those changes are heritable too, by the way.



titled "Evolution as Fact and Theory." The full quote reads: "It is infuriating to be quoted again and again by creationists—whether through design or stupidity, I do not know—as admitting that the fossil record includes no transitional forms. *Transitional forms are generally lacking at the species level, but they are abundant between larger groups*" (Gould 1981, emphasis added).

The point of this exercise isn't just correcting quotes. It's about disarming the argument so that you can move on to the more important point of helping creationists understand that we don't *worship* people such as Darwin and Gould. Even if these quotes were real, even if some major biologist completely changed their mind and became a creationist, even if Darwin renounced the religion of "evolutionism" in his final moments (another claim I hear with unfortunate frequency), it wouldn't change the nearly 200 years' worth of science that has thoroughly supported and even been built upon the reality of evolution.

Much of that science impacts creationists' daily lives, whether they realize it or not. For example, the fossil fuel industry is entirely reliant on the existence of an old Earth that's full of long-dead organic matter, agriculture hinges on the concept of artificial selection, and health care is 100 percent dependent on our understanding of the evolution of pathogens and the evolutionary development of organs. When presented with dogmatic arguments, it's always useful to remind people that, without our understanding of evolution, we wouldn't have pets, gasoline, domesticated crops and livestock, antibiotics, or vaccines. (Although, if you're talking to a creationist, you may want to be careful mentioning vaccines. See Corcoran et al. 2021; Cummings 2021; and Whitehead and Perry 2020.)

Strategy 3: Deny Dualisms

Another remarkably common theme in creationist media is the false dilemma fallacy. In fact, the tendency to see things in strict black-and-white terms is such a hallmark of the dogmatic thinking I mentioned earlier that false dilemmas appear in almost every bit of creationist media I review. Considering this, you'd think this would be the longest section in the article, but ironically the sheer frequency of this terrible argument makes it the simplest to recognize and refute.

The thinking goes like this: If even one small piece of the evolutionary story can be debunked, the entire framework will collapse, leaving creation as the only logical alternative (and by "creation" they mean *their* specific creation myth featuring *their* specific creator from *their* specific interpretation of *their* specific translation of *their* specific version of *their* specific holy book).

However, x=0 is not the same thing as y=1. Even if someone managed to thoroughly dismantle every shred of evidence for evolution, leaving us with absolutely no foundation for modern biology, that would not do anything to support the claims of creationism any more than proving that your parents didn't hide the Easter eggs would support the existence of the Easter Bunny. Every claim requires its own evidence—and that is something that no creationist has ever provided.

Creationists' most common attempt at providing "evidence" for their claims is to simply point to the lack of explanation (or, more often, their own refusal to accept the explanation) for important concepts and events in natural history. Unfortunately for them, whether we're talking about chemical evolution, abiogenesis, or the existence of the bombardier beetle, *ignorance isn't evidence*. Whatever you do, do not let yourself fall into the anti-logic trap of a strict evolution-or-creationism dichotomy. Science simply doesn't work that way.

Strategy 4: Make It Matter

The final and most compassionate strategy that I present here is to do your best to make the science you're presenting matter to the people you're trying to educate.

Try to remember that this person may be coming from the point of view that the entire universe was meticulously constructed by hand with them in mind. It can be pretty scary to step from that comfort zone out here into the void with us. It's up to you, the educator, to help them see that there is beauty, wonder, and majesty to be found throughout the natural world, if only you take the time to look for it.

Personally, I accomplish this by weaving my genuine

love of life and learning into every science lesson that I can. Whenever possible, I do my best to show (not just tell) my audience the awe and reverence I feel for the natural processes of the universe around me.

I share how connected I feel to everything in the universe when I think about stellar nucleosynthesis—creating the elements that make things such as planets, water, diamonds, cheese, and people.

Or how I feel like I'm at a family reunion everywhere I go when I think about evolution and ecology—how all life is related and interconnected.

And how I feel like I'm so much bigger than I really am when I think about the unbroken chain of matter and life going back billions of years all leading up to me.

And, yet, I feel so much smaller than I really am when I think about the unfathomable vastness of the cosmos all around me—twenty-eight billion parsecs across and expanding every second (Bars et al. 2010).

I feel motivated and energized when I think about the fact that my life is draining away at every moment. I know that I will die (probably sooner than I think), and there's so much more that I want to do before then.

Yet I feel so at peace when I think about the biogeochemical cycles that move the carbon, nitrogen, phosphorus, water, and every other part of every living thing through every ecosystem across the planet. The atoms in my body are merely borrowed from this world and will be used by countless other organisms as soon as I'm gone.

I feel that I am completely without purpose when I think about the timeline of evolution—all those species coming and going in the blink of an eye and my own species only having been around 200,000 years.

And yet I feel that I have immense purpose when I realize that, just by my very existence, I am a shaper of the story of humankind. My community relies on me just as I rely on it and, whether I want to be or not, I am a significant piece of the history of my species.

When I think about science, the smallest things feel huge, and the biggest things seem tiny. I feel every emotion imaginable all the time all at once, and that overwhelming elation is something that can only be produced by pondering the magnificent nature of nature.

For every charlatan that I make videos about, there are countless more people who have more or less the same doubts but none of the malice. They don't understand the science. Perhaps they were never allowed to learn science. They may not even know what science is or how it works or where it comes from. That's where we are needed most.

Every child is born with the capacity for the kind of wonder that science provides, and a scientist is just a child who survived. So maybe—just maybe—if I can pass on a tiny spark of my excitement to a creationist, it might just reach them in a way that doesn't leave them feeling judged or abandoned.

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So, to recap, if you want to teach a creationist about evolution, try these useful strategies: Memorize the Meaning, Deviate from Dogma, Deny Dualisms, and Make It Matter.

Putting these together, you get the handy acronym MMDDDDMM. (Full disclosure: that's not a word, but if you read those letters as Roman numerals, they add up to 6,000, which is roughly the age of the Earth according to young earth creationism.)

Teaching evolution to creationists is an uphill battle that's been raging for hundreds of years. You won't win it overnight, but if you can reach just one person, you'll be helping to free them from the shackles of dogma and protecting the future from a population who would burn the world around them out of confusion and fear. And that is a very worthy endeavor. ■

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The Alternate Universe of Irregular Health Care, Part 1

Quackery is a largely unrecognized population health menace that harms consumers. It thrives with insufficient premarketing requirements for scientific testing under consumer protection law and the illusion of legitimacy.

WILLIAM MATTHEW LONDON

I became an anti-quackery activist in 1987 when I started planning a one-day conference on "Taking the Fraud out of Health" to be held at Kent State University on April 18, 1988. The conference turned out to be the launching pad for the Ohio Division of the already established but now defunct National Council Against Health Fraud (NCAHF).

At the time, I was optimistic about governmental and non-governmental efforts to reduce the harmful impact of quackery—also known as health fraud—on population health in the United States. But nearly forty years later, quackery is a largely unrecognized menace to population health and a threat to consumers' financial stability.

Quackery and Health Fraud

In 1984, Congressman Claude Pepper (D-FL), who chaired the House Subcommittee on Health and Long-Term Care, issued a report on the subcommittee's investigation of medical quackery. The report concluded that medical quackery was a massive problem. It conservatively estimated that quackery cost the nation $10 billion a year. It defined *quackery* as "the promotion of medical remedies known to be false or which are unproven for a profit" (Chairman 1984, 183) and *quack* as "anyone who promotes medical schemes or remedies known to be false, or which are unproven, for a profit" (Chairman 1984, 4).

Unfortunately, the report has been largely ignored and forgotten. Congressional subcommittees in the early 1990s held hearings about diet industry quackery (Deception 1990) and medical device quackery (Recent 1992). But no recent follow-up report on quackery has been published by any federal government entity.

In 1986, NCAHF offered its own definition: "Promoting health products, services, or practices of questionable safety, effectiveness, or validity for an intended purpose."

The key word in these definitions of quackery is *promotion*, which *Merriam-Webster* online defines as "to contribute to the growth or prosperity of." Promotion occurs via advertising, publicity, sales presentations, and word-of-mouth.

The meaning of *quack* comes from the early modern Dutch word *quacksalver*, a compound formed from *quacken* meaning "chatter" or "prattle" and *salf*, the Dutch relative of the English *salve*. *Quacksalver* thus denotes "someone who prattles on or boasts about the efficacy of his remedies" (London 2001). Thus, I like to say that quacks quack; they make a lot of noise about the products, services, and practices they offer.

Quackery isn't simply the *provision* of unproven offerings. Responsible health professionals don't always have a proven remedy for each patient's particular health problems. They may *provide* unproven treatments for which there is a sound rationale to expect some potential for benefits that could be worth likely risks if their patients give their informed consent. They may refer patients to relevant clinical trials in which unproven treatments are tested experimentally in addressing a particular health concern, again with informed consent and other protections of the rights of research participants. But they don't *promote* unproven treatments to attract or retain business. And they don't *promote* biologically implausible claims that a product or service will enhance health in any specified way. Some quacks make claims that make so little biological sense (e.g., remedies can be made more potent by successively diluting them so much that no originally present molecules remain) that it seems like they operate in an alternate reality, a topsy-turvy universe.

Among quacks, charlatans are the deliberate fakers. Cranks are quacks with misguided ideas about health they truly be-

lieve in (Jarvis 2022). Cranks seem to have a knack for engaging in some charlatanry. And some charlatans may come to believe their own deceptions.

As of this writing, the secretary of U.S. Department Health and Human Services (HHS), Robert F. Kennedy Jr., while denying scientific evidence of well-established medical and public health practices, endorses various unproven health remedies and regimens (HHS Watch 2025). Kennedy is the noisiest, most misguided, high-level federal health official of any kind we have ever had. He has vowed to end what he calls the U.S. Food and Drug Administration's (FDA) war on "alternative medicine," even though he acknowledges that many people will get bad results from unproven therapies and there will be many charlatans operating (Jewett 2025).

Quacks often use marketing buzzwords for the kind of health care they offer. Popular buzzwords include *alternative*, *integrative*, *functional*, *holistic*, *biological*, and *natural*. I prefer to call their offerings *irregular health care* or *irregular medicine*.

Today, the term *quackery* is rarely used in the United States. Nevertheless, actual quackery thrives via social media, podcasts, videos, websites, multilevel marketing, etc. Much of today's U.S. "wellness economy" is driven by quackery. According to a Global Wellness Institute report in January, the U.S. wellness economy is valued at $2 trillion ("United States Wellness" 2025).

NCAHF disseminated a definition of *health fraud* (Health Fraud 1986), a more serious-sounding name for quackery: "Health fraud is the promotion, for financial gain, of fraudulent or unproven devices, treatments, services, plans or products (including, but not limited to, diets and nutritional supplements) that alter or claim to alter the human condition. Those who promote such medical remedies that do not work or have not been proven to work are called 'quacks.'"

The definition refers not to *profit* but more inclusively to *financial gain*. Promoters of faith healing gain financially, not by profit but by seducing people into making donations to their churches in support of illusory miracles.

Health fraud should not be confused with *health insurance fraud*, which is sometimes called *health care fraud*. Although quacks sometimes defraud insurance companies while scamming consumers, health insurance fraud or abuse typically involves activities other than quackery, such as billing for services not rendered or billing for medically unnecessary services. Health fraud commonly involves no third-party payers.

The FDA's webpage devoted to health fraud scams links to various resource pages. Because product regulation, not health professions regulation, is within the FDA's purview, one resource page offers a product-focused description of health fraud: "articles of unproven effectiveness that are promoted to improve health, well being or appearance" (Kurtzweil 2018). The articles include drugs, devices, foods (which include dietary supplements, under the law), and cosmetics for human or animal use.

The FDA recently identified Umary and Amazy, which are marketed as dietary supplements to treat pain and other conditions, as health fraud scams. Like many other products marketed as dietary supplements, the FDA found them to contain drug ingredients not listed on the product label ("Umary and Related" 2025).

Ironically, a company with the reassuring name of Purity First Health Products had to recall various lots of vitamin and multimineral capsules the company sold after it was revealed that FDA tests in 2013 indicated they contained steroids ("State Health Department Warns" 2013).

Solid scientific evidence is needed to assure the accuracy of product ingredient labeling and substantiate claims for the safety and effectiveness of health products, services, and regimens. Quacks bypass or take shortcuts around their obligations to be accountable to consumers. They oppose scientific expectations required for consumer protection.

For a new drug product to be "proven" safe and efficacious (meaning it achieves its intended medicinal purpose under the ideal conditions of properly designed clinical trials), it must meet scientific standards set by the FDA. *Proven* is regulatory language. Scientific evidence may provide substantiation, validation, or verification, but it offers only provisional proofs, not irrefutable proofs offered by deductive logic and for mathematical theorems. Occasionally, significant hazards of drug products that were proven safe and efficacious are recognized through post-marketing surveillance as product use becomes increasingly widespread. For such products, labeling may be required to include special warnings, or approval for marketing can be revoked.

Regulation based on scientific considerations is not flawless, but it can be self-correcting, and it's the best way to be accountable to the public. Various federal laws enacted during the twentieth century provided much needed protection of consumers from health products quackery, but others reduced consumer protection (Barrett 2001).

Progress in Science-Based Consumer Health Protection

Secretary Kennedy proposes to "Make America Healthy Again" but doesn't seem to be clear on what era in American history he wants the nation's health to emulate. I worry that he will bring us back to the golden age of quackery in the late nineteenth century, when life expectancy from birth in the United States was well under fifty years. His replacement of members of the CDC's Advisory Committee on Immunization Practices with promoters of false and misleading health information is ominous (Stone and Huang 2025).

It wasn't until 1906, when the federal Pure Food and Drug Act was passed, that foods were required to be pure and wholesome and the ingredients of drug products were required to be listed on labels. An amendment to the law in 1912 prohibited drugs that were labeled with false therapeutic claims intended to defraud the purchaser, but it lacked adequate enforcement provisions.

In 1938, the Federal Trade Commission Act of 1914 was amended to give the Federal Trade Commission (FTC) regulatory authority against unfair or deceptive advertising, including the purchase of food, drugs (but only nonprescription drugs today), devices, or cosmetics. The FTC enforces laws

against business monopolies and a variety of unfair business practices, thereby protecting consumers as well as businesses competing fairly.

A multi-year legal battle by the FTC and New York's attorney general culminated in a federal district court order in 2024 requiring Quincy Bioscience to stop marketing its Prevagen product with memory-improvement claims. Quincy Bioscience complied with the order, but it continues to promote Prevagen as offering "brain support," a claim that is meaningless ("Prevagen Scrubs Memory-Improvement" 2024).

Last November, following a court order it obtained, the FTC sent more than $536,000 in refunds to 56,686 consumers who bought Sobrenix, a dietary supplement that had been marketed by Rejuvica using unsupported claims of reducing and even eliminating alcohol cravings and consumption ("FTC Sends More" 2024).

Unfortunately, the FTC will no longer be able to obtain refunds for consumers misled by marketers. In 2021, a U.S. Supreme Court ruling and other recent court rulings eliminated the FTC's longstanding authority under a section of the FTC Act to recover money for harmed consumers (Nylen 2021). The FTC asked Congress to restore that authority with new legislation, but a new bill—the Consumer Protection Remedies Act of 2022—never moved beyond the Senate Committee on Commerce, Science, and Transportation.

The major federal consumer protection law regarding health products is the 1938 Food, Drug, and Cosmetic Act (FD&C), which called for the safety of those substances. New drug products, but not drug products already on the market, had to be approved by the FDA for safety before they could go on the market.

Unfortunately, a provision of the FD&C recognized as drugs all substances included in the *Homeopathic Pharmacopoeia of the United States*. The book describes how more than 1,200 substances should be prepared for use in the practice of homeopathy. Each of those preparations was deemed safe and effective according to uncontrolled, inconsistently conducted tests called "provings" (Junod 2003). These preparations can be sold legally today even though the FDA does not recognize them as effective.

It was not until 1962 that the FD&C was amended to require manufacturers to provide substantial evidence to the FDA that a new drug is not only safe but also effective before it can be approved for marketing. The 1962 amendment also moved regulatory authority over prescription drug advertising from the FTC to the FDA.

The FD&C was amended again in 1976 to give the FDA authority to require premarket approval for some types of medical devices and performance standards for others. While it provides some significant consumer protection, hazardous medical devices continue to be promoted.

For example, by 2024, more than thirty-three patients alleged in lawsuits that the Anterior Growth Guidance Appliance (AGGA) dental appliance, typically worn for several months to treat jaw problems and obstructive sleep apnea, resulted in flared teeth, damaged gums, exposed roots, erosion of the bone that holds teeth in place, and/or lost teeth. Without admitting liability and while denying wrongdoing, the manufacturer and the developer of the device settled lawsuits with at least twenty patients (Kelman and Werner 2024).

Regress in Science-Based Consumer Health Protection

William T. Jarvis, the first president of NCAHF, described the 1976 Proxmire Amendment to the FD&C as "the first piece of modern legislation to weaken rather than strengthen consumer protection in the health product marketplace" (Jarvis 2002). The law was enacted because the health-food industry misled many of its customers into believing that the FDA intended to greatly restrict the sale of supplement products. Consumers, along with sellers of supplements, responded with more than a million protest messages to Congress (Marshall 1983, 15). The law prohibited the FDA from limiting the potency of ingredients of vitamin and mineral products that are not inherently dangerous. It also prevented the FDA from ridding the marketplace of useless "dietary

Visit quackwatch.org to learn more about health frauds, myths, and misconduct.
Find the "HHS Watch" page to keep tabs on how RFK Jr. is hurting health in America (quackwatch.org/hhs-watch/).

supplement" ingredients and irrational combinations of ingredients ("Pro-Quackery Legislation" 2001).

The Dietary Supplement and Health Education Act (DSHEA) of 1994 was enacted following massive lobbying efforts of the so-called health-food industry. It greatly weakened the FDA's ability to protect consumers from unsubstantiated claims made in product labeling and advertising (Barrett 2020). Some provisions of the law are: (1) recognition of herbs and many other substances that lack nutritional value as "dietary supplements," (2) placing the burden of proving specific supplements causing harm on the FDA rather than placing the burden of proving safety on supplement marketers, (3) establishing the Office of Dietary Supplements within the National Institutes of Health, and (4) allowing statements of nutritional support under some circumstances. "Statements of support" can: (1) claim a benefit related to classical nutrient deficiency disease, (2) describe how ingredients affect the structure or function of the human body, (3) characterize the documented mechanism by which the ingredients act to maintain structure or function, and (4) describe general well-being from consumption of the ingredients ("Questions and Answers" 2024).

Nutritional support statements make no sense for substances allowed in dietary supplements that have no nutritional value. The phrasing "*classical* nutrient deficiency disease" seems to legitimize fanciful nutrient deficiency diseases promoted by some quacks.

When dietary supplement manufacturers make allowable structure/function claims, claims of a benefit related to a classical nutrient deficiency disease, or claims of general well-being, they are required to place this disclaimer on the dietary supplement product label: "This statement has not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease" ("Questions and Answers" 2024).

Because DSHEA permits products to be marketed without presenting proof of their quality to the FDA, problems for consumers include microbial contamination, heavy metal contamination, adulteration with prescription drugs, products containing herbs substituting for those on the label, added ingredients to herbal products, and inaccurately labeled ingredient dosages (White 2020).

The Dietary Supplement and Nonprescription Drug Consumer Protection Act (S. 3546), enacted in December 2006, requires manufacturers of dietary supplements and nonprescription drugs to notify the FDA about product-related adverse events, including deaths, life-threatening experiences, inpatient hospitalization, persistent or significant disability/incapacity, and birth defects, or the need for medical intervention to prevent any such problems. The law was a response to concerns about how difficult it was under DSHEA for the FDA to ban sales of ephedra even though thousands of people had adverse reactions to the herbal supplement. But it is still difficult under DSHEA to get dangerous dietary supplements off the market (Barrett 2020).

Misleading Legitimacy for Irregular Medicine

In 1992, primarily through the efforts of Senator Tom Harkin (D-Iowa), the Office of Unconventional Medicine, soon renamed the Office of Alternative Medicine (OAM), was launched within the National Institutes of Health. OAM was assigned to investigate so-called alternative methods. Harkin's OAM Council nominees included representatives of Tijuana clinics offering dubious cancer treatments (Sampson 2002). OAM's director resigned in 1994 under pressure from Harkin and advocates of dubious alternatives to promote certain therapies and take "end run around objective science" (Marshall 1994). In 1998, when NIH's director placed OAM under more scientific control, Harkin countered by elevating OAM to the National Center for Complementary and Alternative Medicine (NCCAM). OAM's initial annual budget was $2 million. By 2003, it was $113.4 million (Sampson 2002).

NCCAM's funding of research, training, education, and business development related to so-called alternative health care modalities value wasted billions of dollars through December 2014 when it was renamed the National Center for Complementary and Integrative Health (NCCIH). The most promising investigations could have been conducted through other NIH institutes and centers (Mielczarek and Engler 2012; Mielczarek and Engler 2013; Mielczarek and Engler 2014; Engler and Mielczarek 2015).

David Gorski, MD, PhD, FACS, concluded his analysis of NCCIH Strategic Plan FY 2021–2025 by saying: "The new plan is the same as old plans, and then some. It's smarter in that it hides the quackery, something the last plan did, but in a cleverer way. Sadly, NCCIH appears to be back and poised to be as quacky as ever" (Gorski 2021).

President Clinton gave misleading legitimacy to irregular medicine by establishing the White House Commission on Complementary and Alternative Medicine Policy, which issued a report in 2002 recommending various ways of promoting irregular health care methods ("Analysis of the Reports" 2002).

What's the Harm?

Financial harm is likely the most common harm caused by quackery. People waste their own money and the money of others obtained through crowdfunding appeals to pay for ineffective, irregular medicine treatments. Quackery promoted through governmental agencies isn't the most wasteful type of government spending, but it should be avoidable.

Quackery harms directly through toxicity of administered substances and injuries resulting from trauma-inflicting treatments. It causes indirect harm by diverting people away from rational and science-based health care that can help them. It causes psychological harm when people realize they've been duped, due to the stress of maintaining demanding health regimnes quacks insist are necessary, and from quacks casting blame on their victims who don't respond well to treatments. It causes societal harm by spreading unwarranted mistrust in responsible health care and science. By undermining science, quackery undermines consumer protection and how health claims and information can be validated.

* * *

In the second part of this article (to be published later), I will address how many irregular medicine advocates promote alternate realities to a scientific worldview. I'll discuss how they promote aberrant health threats, diagnoses, screening methods, diagnostic methods, disease prevention, health promotion, treatments, views about evidence, journals, health occupations, and credentials. ■

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The Case of the Vegetable Man of West Virginia

The fantastic tale of a mysterious single encounter in the Mountain State raises questions. Was it an isolated incident or an out-and-out hoax?

DANIEL A. REED

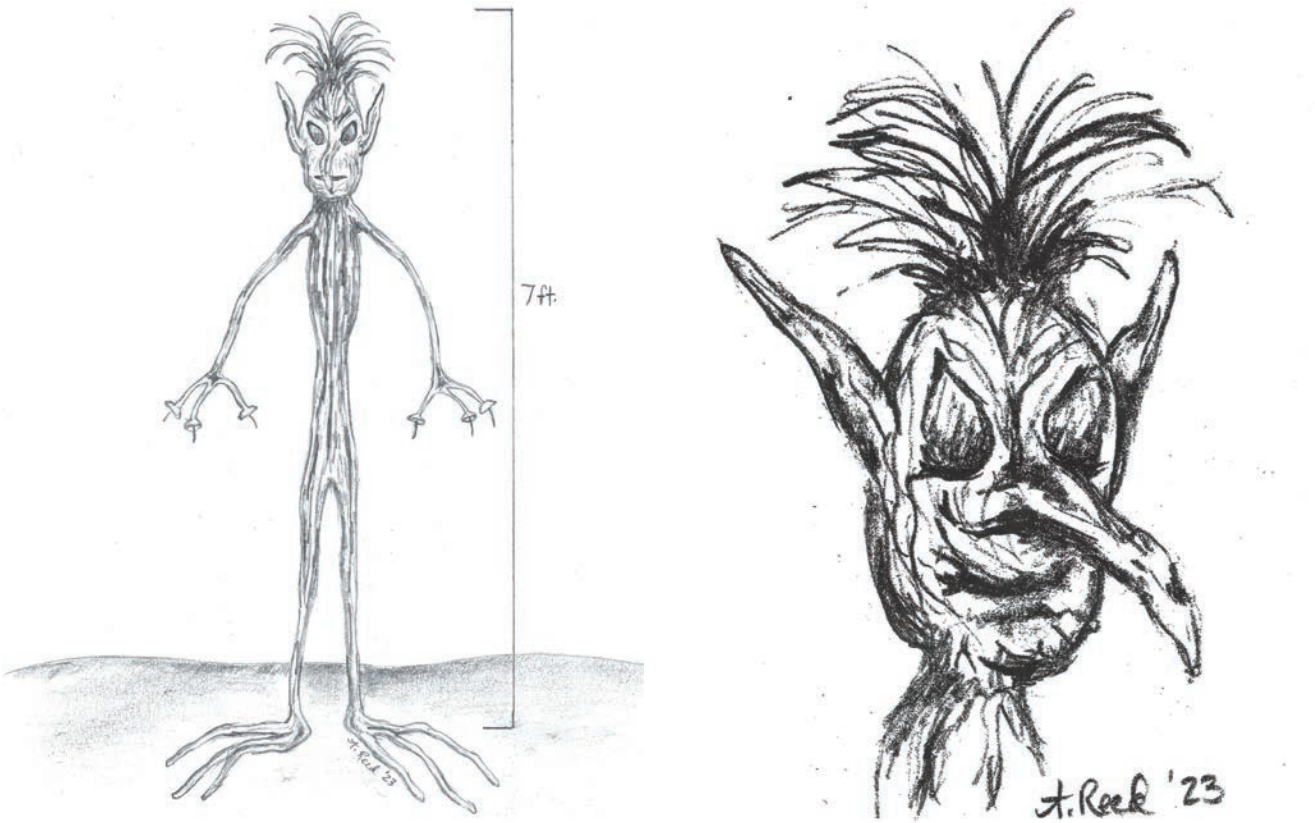
Nestled in the central region of the Appalachian Mountains in the eastern United States lies West Virginia, a state that has spawned countless stories featuring strange and mysterious creatures. The most famous legends from the Mountain State include the eldritch Flatwoods Monster (1952) and Mothman (1966–1967), both of which have become para-celebrities of Fortean fame.

There is yet another lesser-known entity said to have been seen in the rugged hills of West Virginia that is equally, if not more, bizarre than his more famous counterparts. Further, the strange tale of this otherworldly creature has a most fascinating connection to his renowned cryptid cousins. This is the story of the enigmatic Vegetable Man of West Virginia (Barker 1976, 10–14; Brewster 2016; Veggieman 2023; Vegetable Man 2018; Gorski 2023; Morphy 2016; Steiger 1978, 57–61).

The Story

The story of the Vegetable Man originates in Grant Town, a township in the north-central part of West Virginia, population 685 (U.S. Census Bureau 2023). It was during July 1968 that Jennings Frederick had been hunting groundhogs just before he was scheduled to enter into service in the United States Air Force. As the story goes, Frederick had been unsuccessful in procuring any game for that day and returned home.

As he walked beneath some maple trees, Frederick reported that he paused as he suddenly heard "a high-pitched jabbering, much like that of a recording running at an exaggerated speed" (Barker 1976, 12; Stieger 1978, 57; Morphy 2016). It was reported at the time that it was unclear to Frederick whether he was hearing the voice audibly or if he was perhaps receiving a message telepathically (Barker 1976,



Renderings of the Vegetable Man based on Jennings Frederick's description and drawing. Illustrations by Ann Reed.

12; Stieger 1978, 57; Veggieman 2023). Either way, Frederick recounted the voice as having said, "You need not fear me. I wish to communicate. I come as friends. We know of you all. I come in peace. I wish medical assistance. I need your help!" (Barker 1976, 12)

Taken aback, Frederick reached for a handkerchief from his pocket to wipe away perspiration and suddenly "winced" in pain (Barker 1976, 12). It was reported that initially Frederick thought he had snagged his hand on some briars, but he soon came to realize that he had become entangled by something far more sinister: "Attached to his wrist was what looked like a thin, flexible right hand and arm" (Barker 1976, 12) of a humanoid creature, approximately seven feet tall (Barker 1976). The creature was alleged to have had arms that "were no bigger around than a quarter" and that it had hands with "three seven-inch-long fingers with needle-like tips and suction cups" (Steiger 1978, 57). Frederick described the creature as having "semi-human facial features" (Barker 1976, 12), with yellow eyes and "pointed ears" (Barker 1976, 12–13). See the illustration on p. 56 for a rendering of the creature based on Barker's description and drawings that appeared in the newsletter carrying the story. The creature used its sharp, pointed, fingertips to pierce a blood vessel in Frederick's arm, and hearing "a suction sound" (Barker 1976, 12), Frederick realized that the creature was extracting blood from his arm while continuing to hold him in an ever-tightening grip.

As Frederick "cried out in pain from the incisions and fright" (Barker 1976, 13), the eyes of the creature began to change, alternating in color from yellow to red. The colors in the creature's eyes began to rotate, resulting in the effect that they became orange circles that had a "hypnotic effect" on Frederick, sedating and immobilizing him (Barker 1976, 13). In addition to being frozen "in his tracks," his "terror had also vanished" (Barker 1976, 13). While Frederick was uncertain as to how long he was in the creature's grip, he believed that the experience only lasted "about a minute" (Barker 1976, 13).

Upon releasing him, the creature bolted up the hill, making "great leaping jumps" that covered a distance of at least twenty-five feet per leap (Barker 1976, 13). As the creature crested the hill, it disappeared into the woods, and Frederick noted that the pain from the trauma returned to his arm. Staring at the point where the creature had vanished, Frederick stated he heard a "humming and whistling sound coming from the woods, as if the saucer the creature may have arrived in were taking off" (Barker 1976, 13), thereby "implying that the creature was of extraterrestrial origin" (Veggieman 2023).

As the story goes, Frederick unsteadily made his way home, where he washed and dressed his wounds from the encounter. Fearing that he would not be believed, he told no one about the event, telling his family that his wounds had been caused by briars (Barker 1976, 13; Steiger 1978, 58). Following this encounter, the creature has never been reported as having been seen by anyone ever again (Veggieman 2023). "The story did not come out until he [Frederick] related it to his friend Barker some months later," according to veteran mystery-monger Brad Steiger (1978, 58). Since that time, the story of the Vegetable Man has been noted several times in print, on podcasts, and on the internet (Brewster 2016; Veggieman 2023; Steiger 1978, 57–61; Morphy 2016; Vegetable Man 2018), and the story also appeared as an interest piece on a central West Virginia news website (Gorski 2023).

The Reveal

To some, the story may read more like the plot summary of a low-budget science fiction movie rather than a legitimate encounter with an extraterrestrial. Legends of animated flora date back to antiquity, ranging from Pinocchio to mandrake roots (which resembled human form and were said to shriek in terror when pulled from the earth, risking the health, sanity, or even life of those who dug it up).

Nevertheless, there are those who report the story as if it were an actual historical event, and it continues to garner attention among mystery-mongers and purveyors of woo. Several of them portray the encounter as actually having happened (Barker 1976, 10–14; Veggieman 2023; Steiger 1978, 57–61; Vegetable Man 2018). But what is the connection between this story and that of the Flatwoods Monster and Mothman? The answer is Gray Barker.

Barker, who was a theatrical film booker and educational materials distributor based in Clarksburg, West Virginia, wrote and published various books and periodicals regarding UFOs and related phenomena for approximately thirty years (Sherwood 2002, 40). A graduate of Glenville State College (now Glenville State University) in 1946 (Reed 2023), Barker's prominence in the world of UFOlogy grew after the story of the Flatwoods Monster surfaced. Conducting interviews with witnesses and penning his observations in a seemingly impartial manner (Sherwood 2002, 40), Barker submitted his work and subsequently had it featured in *Fate* magazine, a publication dedicated to paranormal and unexplained phenomena, in an article titled "The Monster and the Saucer" (Barker 1953, 12–17).

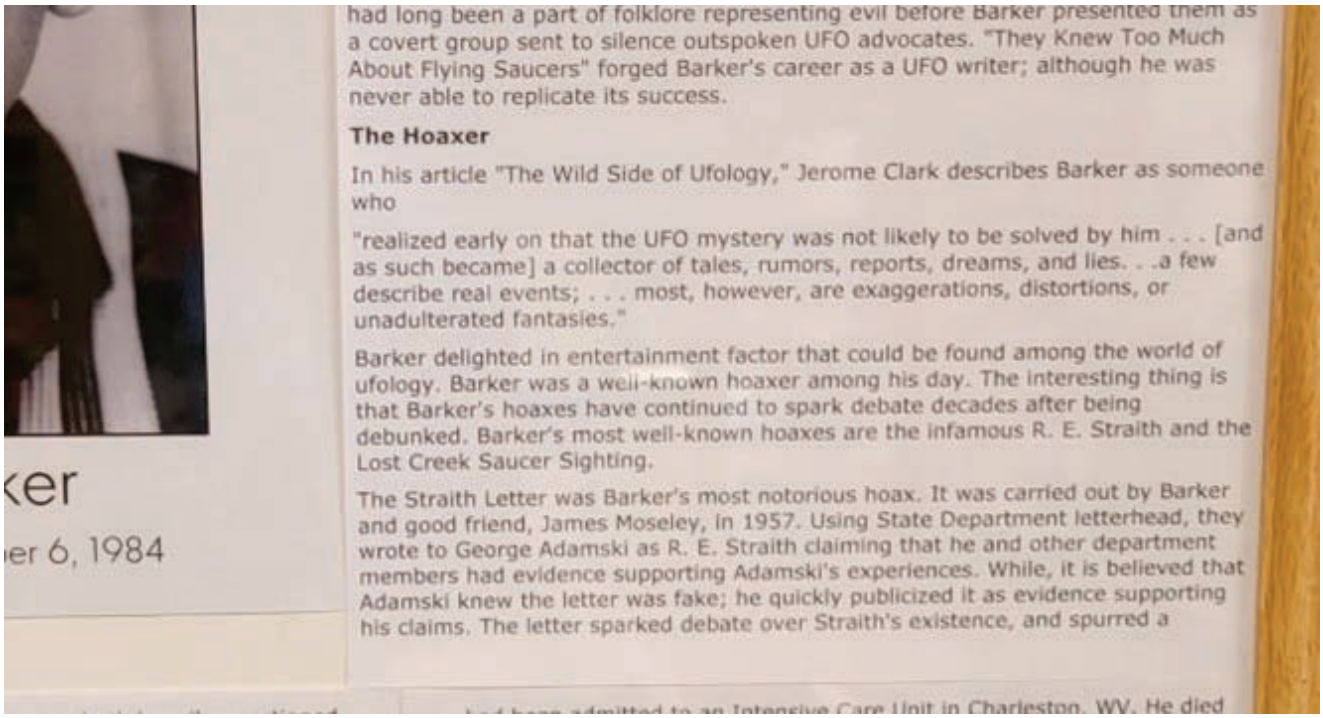
While John Keel is credited with bringing the legend of Mothman to fame with his book *The Mothman Prophecies* (Keel 1975), Barker had published a book about the supposed Mothman incident, *The Silver Bridge*, five years earlier (Barker 1970). In this book, Barker describes Men in Black, Ingrid Cold, and other details that have long been associated with the Mothman legend, bringing them to life in the manner typical of his "docudrama" style (Barker 2002, 5). Though overshadowed by Keel's later work, Barker's *The Silver Bridge* helped lay the foundation for a tale that had, in modern parlance, "gone viral."

In addition to his book and article in *Fate* magazine, Barker wrote copiously about UFOs and other related phenomena. In September 1953, Barker published the first volume of his UFO magazine, *The Saucerian*, later renamed *The Saucerian Bulletin*, which continued to be published until October 1962. Further, he published *Gray Barker's Newsletter* from 1975 until 1984, and it is in the March 1976 edition of this publication that the story of the Vegetable Man can be found (Gray Barker UFO Collection 2023).

Various sources refer to Gray Barker as a chronic and known hoaxer. As John Sherwood attested in an article about his association with Barker, "material touched by Gray Barker's enterprising hand is tainted by self-serving deceit." Sherwood went on to say that Barker "launched hoaxes, joined others' deceptions, and manipulated people's beliefs" (Sherwood 2002, 39). Indeed, the Clarksburg-Harrison Public Library that houses the Gray Barker Collection (see Photograph A) has a subsection of Barker's biography on their website titled *The Hoaxer*. The website says, "Barker was a well-known hoaxer among his day," and "The interesting thing is that Barker's hoaxes have continued to spark debate decades after being debunked" (Gray Barker UFO Collection 2023).

[A] The author perusing the files of the Gray Barker Collection, which is housed in the Waldomore House of the Clarksburg-Harrison Public Library in Clarksburg, West Virginia. Photo by David Houchin, archivist (2023).

[B] Photograph of the Gray Barker display at the Flatwoods Monster Museum in Sutton, West Virginia. Photo by the author (2022). Used with permission of the Flatwoods Monster Museum.


had long been a part of folklore representing evil before Barker presented them as a covert group sent to silence outspoken UFO advocates. "They Knew Too Much About Flying Saucers" forged Barker's career as a UFO writer; although he was never able to replicate its success.
The Hoaxer
In his article "The Wild Side of Ufology," Jerome Clark describes Barker as someone who
"realized early on that the UFO mystery was not likely to be solved by him . . . [and as such became] a collector of tales, rumors, reports, dreams, and lies. . .a few describe real events; . . . most, however, are exaggerations, distortions, or unadulterated fantasies."
Barker delighted in entertainment factor that could be found among the world of ufology. Barker was a well-known hoaxer among his day. The interesting thing is that Barker's hoaxes have continued to spark debate decades after being debunked. Barker's most well-known hoaxes are the infamous R. E. Straith and the Lost Creek Saucer Sighting.
The Straith Letter was Barker's most notorious hoax. It was carried out by Barker and good friend, James Moseley, in 1957. Using State Department letterhead, they wrote to George Adamski as R. E. Straith claiming that he and other department members had evidence supporting Adamski's experiences. While, it is believed that Adamski knew the letter was fake; he quickly publicized it as evidence supporting his claims. The letter sparked debate over Straith's existence, and spurred a

[C] Enlarged view of the Gray Barker display, which acknowledges his known hoaxes. Photo by the author (2022). Used with permission of the Flatwoods Monster Museum.

The Braxton County (the county wherein the town of Flatwoods is located and the place where Gray Barker grew up) tourism website speaks of how Barker's writings "frustrated many ufologists with his well-crafted stories and cleverly devised hoaxes" (Gray Barker, a Braxton County Legacy, 2020). The acknowledgement of Barker's questionable reputation does not stop there: The Flatwoods Monster Museum in Sutton, West Virginia, has a display dedicated to Barker and his writings related to the Flatwoods Monster. The display references some of the more famous hoaxes attributed to Barker, directly referencing the information on Barker's bibliography from the Clarksburg-Harrison Public Library's website (see Photographs B and C).

The Rest of the Story

While the narrative as I have relayed it is the version that is most commonly retold in print, on websites, and through podcasts, there is a bit more to the story in the original source material by Barker. In his article, he writes of an alleged encounter that Frederick's mother had in April 1965 with a "saucer shaped aircraft" about ten feet in diameter and five feet in height. Tethered to the saucer was a small, unclothed, "black or dark green colored creature" that looked "more animal, or even Satanic, than human," described as having "pointed ears and a tail." Seeing this, it was reported that Mrs. Frederick ran back inside her house, got into bed, pulled the covers over her eyes, and hoped the creature would go away (Barker 1976, 11).

After approximately fifteen minutes, Mrs. Frederick gathered enough courage to look out her kitchen window just in time to see the creature enter the saucer. In short order, the device, buzzing and rotating, ascended into the sky and disappeared from her sight. According to the article, when Frederick returned home from school, his mother relayed the story to him. Investigating the site where his mother reported seeing the saucer, Barker states that Frederick found depressions in the ground where the craft had supposedly landed, as well as "claw-like tracks of the creature." Barker reports that Frederick allegedly collected hair samples from the creature's tracks, made plaster of Paris casts of the impressions he found, and photographed the area to document the sighting. Allegedly, Frederick sent these to the U.S. Air Force for analysis and received in reply the "inane explanation" that the craft was a weather balloon, and the Air Force never returned the physical evidence to Frederick (Barker 1976, 11).

Another element of Frederick's story that Barker addresses is the fact that while Frederick was enlisted in the Air Force, he received security clearance and was assigned briefly to duty at NASA. Barker states that Frederick "obviously encountered evidence of some secret project that dealt with UFOs," because he "got the impression" from things Frederick said that he had seen "plans or models of some sort of secret aircraft." Barker reports that he noticed at times during the interview that it almost felt as if the tables were turned upon him and that it was Frederick who was interviewing *him* with respect to how much *Barker* knew of various outré matters instead of the other way around (Barker 1976, 13).

Somewhat predictably, a point that Barker openly acknowledges in the article, Frederick had an encounter with Men in Black "about four months after his honorable discharge" (Barker 1976, 13). Barker reports that Frederick was seized at night, drugged, and interrogated about his encounters with UFOs and what he thought they were, as well as being asked questions about what Frederick knew "about time" and "about the future" (Barker 1976, 14).

Barker ended his article by describing how he pondered all that he had garnered from Frederick as he made his way back to his home following the interview. Interestingly, at the conclusion of his article, Barker included Frederick's mailing address, stating that it was disclosed with Frederick's consent. Barker went on to say that "readers may write" to Frederick, suggesting that if they did reach out to him, they should include "stamped return envelopes and payment for any Xerox copies of files supplied" (Barker 1976, 14).

Analyzing the Vegetable Man

Certainly, the story of the Vegetable Man is an entertaining one, to say the least. It has all the elements of a proper paranormal adventure, including action, intrigue, and an encounter with a mysterious, otherworldly creature with strange and bizarre abilities. But did it really happen? In truth, we will never know. As Benjamin Radford stated in his analysis of the case of the similarly singular-sighted Dover Demon, "Anything is of course *possible*, but the burden of proof is on the claimant," and the question in analyzing cases such as these becomes, "What is probable given the evidence and circumstances?" (Radford 2023, 32).

Barker included elements in his narrative that subtly imply the veracity of Frederick's story and his credibility. Whether this was intentional is, and will always be, unknown. For example, Barker speaks of Frederick's "security clearance" and mentions his "honorable discharge" from service (Barker 1976, 13). These elements bolster the idea that Frederick was an upstanding member of the military. Certainly, if the Air Force gave him security clearance, the implication was that Barker was someone who could be trusted. His honorable discharge implies he was a man of honor, having served his country faithfully and, as such, was one who should be looked upon with respect. Generally, if one trusts and respects another person, it stands to reason that one can assume what the person says is credible. Finally, Barker gives Frederick's address so that his readers could contact him directly. The implication is that surely if this were a contrived story, Barker would not have been so open.

While adding interest to the story, none of these elements that seemingly add validity to the tale have any bearing on whether the story is true. Barker was known to encourage individuals to fabricate stories (Sherwood 1998, 37–39; Sherwood 2002, 40). While we have no evidence to support that Barker conspired with Frederick to weave this particular tale of intrigue, given what we know of Barker it is certainly not inconceivable that this may have been the case. This is the conclusion drawn by Sam Gorski in his public interest piece

for the WBOY TV 12 News website. Gorski refers to the incident as a "little-known hoax" (Gorski 2023).

Setting supposition aside, what are the facts of the matter as we know them? First, the entire case rests on the testimony of one single eyewitness/victim whose *only* recorded report of the alleged incident was made to—and reported by—a known hoaxer. Second, there is no physical evidence to support any aspect of the story, nor was any investigation conducted by authorities at the time. Finally, given the lengths to which Frederick purportedly went to document and collect evidence in his investigation of his mother's alleged sighting, it is curious that he would not have attempted to document his own encounter with the Vegetable Man more thoroughly.

Barker and Frederick are now both deceased, and with their passing the truth behind the story of the Vegetable Man of West Virginia will forever remain a mystery. At this point, we only have Occam's razor to guide our thinking and point us in the direction of the most probable resolution to this puzzle. Given what we know, is it likely that a plant-like creature from another world attacked a hunter, mesmerized him into submission, extracted blood from his body, and then vanished, never to be seen again? Or is it more likely that the story was fabricated by a known hoaxer who, with the help of an accomplice, contrived a fanciful tale to entertain others through a fictional narrative? Given the evidence (or lack thereof), it seems more probable that Frederick and Barker's yarn is simply a good old West Virginian garden-variety tall tale. ■

Acknowledgments

I am grateful to David Houchin, archivist of the Gray Barker Collection at the Clarksburg-Harrison Public Library in Clarksburg, West Virginia, for his time assisting me with my research.

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Three Meetings with the Nazi Doctor Sigmund Rascher

EDZARD ERNST

We have all benefited from the positive influence of a mentor or teacher. In my career, I have been very lucky in this respect. But it is not just positive influence that shapes our lives. A most remarkable impact on my work came from meeting a deeply unethical physician. Though I never met him in person, I encountered the Nazi doctor Sigmund Rascher three times indirectly.

Dachau concentration camp main entrance (guarded by U.S. soldiers after liberation)

Hypothermia

During the 1980s, I worked in a field of research known as hemorheology, the study of the flow properties of blood. Among other things, I investigated the effects of physical stimuli such as heat and cold on hemorheological variables (Ernst et al. 1986; Ernst 1990; Mátrai and Ernst 1991). During these activities, I read up on what others had previously published. This eventually led me to Rascher's cynically cruel experiments exposing prisoners to extreme hypothermia in the Dachau concentration camp.

Already as a medical student, Rascher had joined both the Nazi party, the storm troopers (the SA), and later the SS (Hitler's paramilitary organization). Rascher's partner and eventual wife, Nini Diehl, was a former secretary and possibly the mistress of the Reichsführer, Heinrich Himmler. Rascher was thus introduced to Himmler, and the two conceived several research projects to be carried out on prisoners of the Dachau concentration camp. Soon, Rascher's "connections were so strong that practically every superior trembled in fear of the intriguing Rascher who consequently held a position of enormous power" (Berger 1990).

In one of Rascher's experiments, prisoners were exposed to air pressure corresponding to high altitudes. The aim was to determine how German fighter pilots might best survive after being shot down. Seventy to eighty prisoners died. Rascher also tested the effects of freezing temperature on the body and experimented with various methods of rewarming it. The aim was to improve the survival rate of seamen after their ship had sunk. Another of Rascher's projects investigated a pectin-based preparation, Polygal, that was supposed to promote blood clotting. Prisoners were forced to undergo amputations or be injured by being shot. Rascher aimed to determine whether Polygal would reduce the subsequent blood loss. According to Berger (1990), Rascher "attracted extraordinary attention from Germany's highest officials. His work was reported even to Hitler, who was pleased with the accounts."

My shock over Rascher's pseudoscience became even greater when I realized that he had been a student at the same medical school in Munich where I had studied some forty years later. Not only that, but I also became aware that, in fact, my laboratory was in the building where Rascher had been based.

Anthroposophic Cancer Test

Several years later, in the mid 1990s, I crossed Rascher's path again, this time in the context of my research into so-called alternative medicine.

Rascher had been brought up in Rudolf Steiner's anthroposophical tradition. A close friend of his, chemist Ehrenfried Pfeiffer, had been working on a strange diagnostic method using copper chloride crystallization of blood (Pfeiffer and Miley 1939). And so it happened that copper chloride bio-crystallization (CCBC) became the subject of Rascher's doctoral dissertation (Rascher and Trumpp 1939). He first tested the CCBC for identifying pregnancies and later for detecting cancer in its early stages.

For the CCBC, one drop of blood is dissolved in water. The resulting hemolysate is then added to a copper chloride solu-

tion and let to dry. Subsequently, macroscopic patterns evolve and are evaluated visually for the presence of structures such as transverse, star-like, or hollow formations, which are supposed to indicate cancer, inflammation, benign tumors, or other diseases. In addition, structures resembling organs are claimed to indicate the location of the disease (Kokornaczyk et al. 2021). The CCBC is wide open to interpretation and thus not a reliable method; nonetheless, it is still used today by some anthroposophical or homeopathic practitioners.

With his initial thesis on the CCBC, Rascher had produced surprisingly positive and most likely fabricated results. With the help of Nini Diehl, these findings secured the attention and support of Himmler. An avid follower of the occult, pseudoscience, and alternative medicine, Himmler was taken by Rascher's approach to research (Davis 2019). He thus authorized Rascher to start the above-mentioned series of experiments based in the Dachau concentration camp where, in 1941, an entire research unit was established for him. It housed Rascher's department as well as laboratories where further projects focused on alternative medicines (Ernst 2023; Ernst 2024).

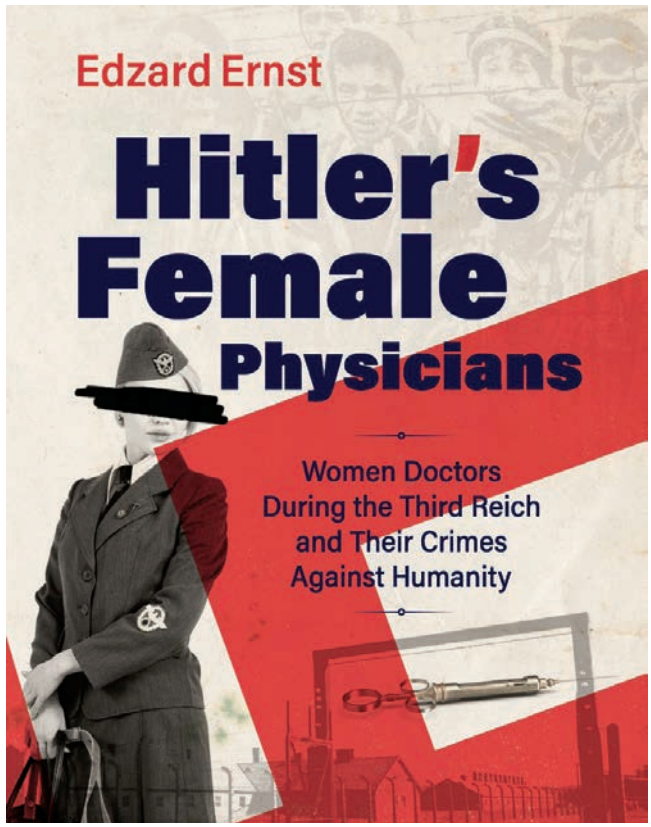
Rascher's Refuge and End

The third time I indirectly encountered Rascher was when I finally came round to reading his biography (Bär 2014). This was when I realized that Rascher had once found refuge in my hometown, Bad Toelz in Bavaria. His home had been in Munich from where he regularly commuted the short distance to Dachau. But when, during the final years of the Third Reich, the allied bombers had rendered life in Munich unsafe, Rascher and his family moved south and rented a house on the outskirts of Bad Toelz. As a boy, I knew his rural accommodation well but had no idea who it once housed.

Rascher's death was as dramatic as had been his life. Toward the end of the Third Reich, he lost Himmler's support and was imprisoned for a string of offenses. He and his wife had stolen babies and pretended they were theirs. To make matters even worse, Rascher had also falsified research data and misused research funds for his personal benefit (Bär 2014).

Himmler thus had Rascher imprisoned without trial. Eventually he was brought back to the place of his worst atrocities, the Dachau concentration camp. Days before the liberation of the camp by the American forces, he was executed on the direct orders of Himmler, who evidently was keen to destroy the evidence about the many projects of unethical pseudo-research he had so enthusiastically supported.

As mentioned above, Rascher and his actions had a profound influence on my life (Ernst 2015). The atrocities committed by Nazi physicians became (and still are) part of my research. The most recent result of these investigations is my book *Hitler's Female Physicians. Women Doctors during the Third Reich and Their Crimes against Humanity* (Ernst 2025). ■



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From 'Tractors' to Cell Therapy Clinics: Unproven Medical Procedures

CURTIS E. MARGO

Mainstream news media reported in March 2017 that three women with age-related macular degeneration tragically lost vision following a procedure called "autologous stem cell transplantation." The article in *The New England Journal of Medicine* that described the events explained how stem cells were harvested from abdominal fat pads, mixed into a slurry with plasma, and then injected into their eyes (Kuriyan et al. 2017). The procedure had not been tested for effectiveness, and there was no evidence of its safety. This clinic—and other "cell therapy clinics" like it—was able to circumvent Food and Drug Administration (FDA) oversight through what many regard as regulatory loopholes. Autologous stem cell transplants are standards of care for a select group of disorders and cell types, but stem cell procedures for eye disease are still considered experimental and should be performed only under stringent regulatory guidelines (Hinkle et al. 2021). The direct-to-consumer business model that allows physicians to sell these unproven interventions at hefty prices has been compared to "charlatans peddling the modern equivalent of snake oil" (Daley 2017).

Disreputable marketing of innovative medical technology is not new. Historian James Harvey Young (1915–2006) wrote about its origins in his investigative masterpiece *The Toadstool Millionaires*, tracing the sordid machinations of charlatanism in America from colonial times to 1906 (Young 1961). Dedicating his academic career to the study of pseudoscience and quackery in America, Young used his research to raise awareness of the harm posed by unregulated nostrums and devices and eventually contributed to legislation that gave the FDA some clout. Young credited Elisha Perkins, an apprentice-trained physician from Connecticut, with elevating the art of medical scamming in America when he received a United States patent for a salutary device in 1796 (Young 1961, 16). His gadget was called "tractors" and was so modest in appearance that it challenged the very concept of a device. It consisted of just two tapered metallic needles three inches in length that looked like horseshoe nails. Made of iron and brass, they were painted silver and gold and sold for $25 (Miller 1935). Given the air of legitimacy by holding a U.S. patent, Perkins asserted the tractors could heal any malady by simply waving the small batons over stricken tissue always from a central to peripheral direction. Their therapeutic properties were attributed to

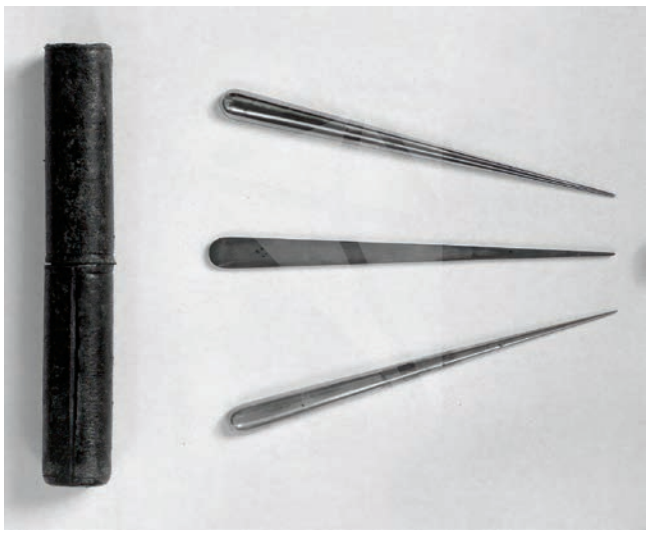

Figure 1. Original Elisha Perkins patented metallic tractors and carrying case. Wellcome Collection.

"drawing off the noxious electrical fluid that lay at the root of the suffering" (Young 1961, 25). They were, in effect, miniature sorcerer's wands. Thanks to Perkins, Americans would no longer need to rely on England for patented remedies.

The sale of tractors made Perkins wealthy. His oversized personality led to influence beyond the business community by earning him followers in the U.S. Congress and the judiciary (Young 1961, 27). Pamphlets advertising the device were filled with personal endorsements claiming it cured everything from rheumatism to lockjaw, and its powers were certified by clergy. Not everyone, however, was taken in by the tractors. Local physicians recognized the tractors as bogus and resented his deceitful claims and disregard for norms (Miller 1935). In 1797, Perkins was expelled from the medical society. To test whether the tractors really alleviated pain, skeptics fashioned imitation wooden sticks and painted them silver and gold (Miller 1935). When they appeared to work, it must have confused the doubters, given that the formal idea of a placebo effect was more than a century away.

When Perkins died and the popularity of the tractors was declining, his son Benjamin moved the business to England. Not trained as a physician, Benjamin decided that the healing properties of metal wands could be better publicized by linking

NEW CASES,
NOT BEFORE IN THIS JOURNAL.

B. A. B.

View of the Front or Flat Side. View of the Back or Round Side.

a, a neat Red Morocco Case, containing a Set of the TRACTORS; B B, a TRACTOR, in a back and front View.—Two of these Instruments, one of which is Yellow and the other of a whitish Colour, constitute the Set. The Mode of applying them for the removal of a Disease on the Human Body and Horses, is explained, to the Comprehension of the smallest Capacity, in a Paper of Directions, which accompanies the TRACTORS.

THE present representation of PERKINS's PATENT METALLIC TRACTORS, is given through this medium with a view to satisfy the daily applications made to the Patentee by his numerous Correspondents, respecting their form, bulk, the proper mode of conveying them, &c. &c. The Observer will here be enabled to form a ready idea of their very portable nature; and, considering their durability and very extensive efficacy in the removal of Diseases, now so universally admitted, "how necessary are they (in the language of the Rev. Dr. Trotter) "as a Remedy in every Family, "and especially as a *vade mecum* for Clergymen, whose professional "avocations lead them so frequently among the afflicted."

An additional motive for the above representation of the GENUINE TRACTORS, are the impositions which are not unfrequently practised by the substitution of counterfeits. These, though not attempted openly, have, in several instances, been privately put in circulation, by persons interested in depreciating the Credit of the GENUINE TRACTORS, and consequently occasioning their disuse. As no benefit would be derived from such spurious Imitations, the unsuspecting patient, it has been supposed, would be satisfied of the inefficacy of the Metallic Practice. Such artifices, while they infringe on the right of the Patentee, at the same time defraud the Public; and he must therefore not be thought unreasonably severe in determining to employ the means the Law affords, for the prevention of such abuses in future. As innocent artificers and tradesmen, from not knowing the nature of his Patent, which secures every possible external application of the Metallic Influence in the removal of Diseases, may be led into a violation of the law, by making something of a different shape, &c. it is right to inform them that they are equally liable to damages with their employers.

To guard against Impositions, applicants will please to observe, that every *genuine* Set of Tractors is stamped with the words, PERKINS PATENT TRACTORS; and, which will be the most sure means of detecting frauds, to the printed Directions for their use, which accompany them, is subjoined a Receipt, signed, "BENJAMIN DOUGLAS PERKINS," in the hand-writing of the Patentee. To counterfeit this is Felony.

THE TRACTORS

Figure 2. Advertisement for metallic tractors claiming to cure disease. It also warns not to be fooled by imposters. Wellcome Collection.

METALLIC-TRACTORS.

Figure 3. Colored aquatint after James Gillray, 1801, showing Benjamin Perkins misusing his father's tractors by draining a mid-facial carbuncle. Wellcome Collection.

them to Luigi Galvani, the recent discoverer of animal electricity. A poem was crafted to celebrate the association:

> See pointed metals, blest with power t'appease,
>
> The ruthless rage of merciless disease,
>
> O'er the frail part a subtle fluid power,
>
> Drench'd with invisible Galvanic shower,
>
> Till the arthritic, staff and crutch forego,
>
> And leap exulting the bouncing roe! (Young 1961, 16)

Benjamin's European business enterprise was short-lived, and he returned to America after being lampooned in local periodicals.

Young appropriated the title for his muckraking book from Oliver Wendell Holms Sr., who wrote "Somebody buys all the quack medicines that build palaces for the mushroom, say rather, the toadstool millionaires" (Young 1961). Holmes was a poet, professor of anatomy and physiology at Harvard Medical School, and father of a future supreme court justice. Young named the chapter featuring Elisha Perkins "Galvanizing Trumpery." He created this memorable pun by linking the dual meanings of the verb *to galvanize* with the word *trumpery* from fifteenth-century French (*tromperie*, "to deceive"), which later in English would come to mean "worthless" and "of no or little value."

The United States has become a leader in the promotion of direct-to-consumer "stem cell clinics." Consumers must be just as vigilant now as they were in early nineteenth-century America to avoid being conned by the aura of novel biotechnology. Determining whether a new or emerging therapy is approved by the FDA is a first step (FDA Devices Index 2024). If not approved by the FDA, any rightful therapeutic intervention seeking validation must undergo rigorous, unbiased evaluation for safety and effectiveness. The decision to participate in a clinical trial during this stage of development requires some research and careful deliberation (Guleria et al. 2022; National Library of Medicine, Clinical Trials 2024). ■

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FUN & GAMES

Edited by Stephen Hupp

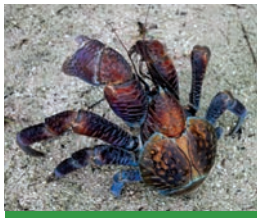
YOU CAN FIND THE ANSWERS TO THESE GAMES IN SECRETS REVEALED (P. 70).

FAKE OUT

At least one of the following animal names is not for a real animal. Can you find the fake(s)?

BANANA SLUG

CACTUS CAT



COCONUT CRAB

LEMON SHARK

TOMATO CLOWNFISH

VEGETABLE LAMB

WORD NOODLE

Make a new word with the same number of letters (green = correct letter and position; yellow = correct letter; black = wrong letter). Clue: EARTHBORN creatures are the product of this.

SILLY SORTING

This list includes books by children's author Dr. Seuss (left) and books by evolutionary biologist Stephen Jay Gould (right). Can you tell who wrote which books? Circle your guesses below.

THE KING'S STILTS

THE SEVEN LADY GODIVAS

MCELLIGOT'S POOL

IF I RAN THE ZOO

THE FLAMINGO'S SMILE

THE PANDA'S THUMB

HEN'S TEETH & HORSE'S TOES

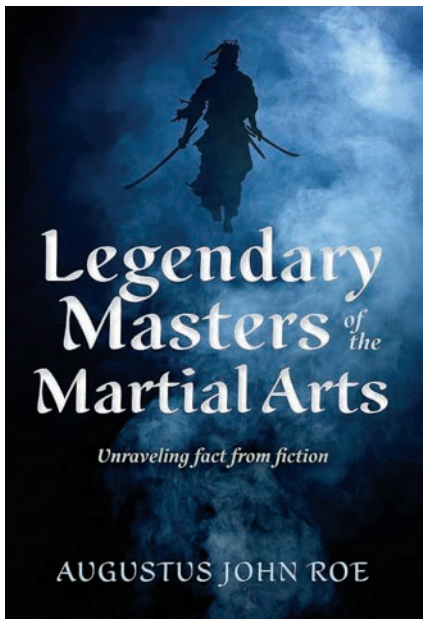
History and Pseudohistory in Asian Martial Arts

Peter Huston

People tell stories of the past for many reasons, with accurate documentation being only one. In the realm of East Asian martial arts, there are many tales of legendary masters who demonstrated amazing capabilities and power. They fought oppressors and gave their students and their students' students therapeutic exercises and fighting techniques. They also demonstrated a path to living with meaning, purpose, and empowerment. But some of these histories of legendary martial arts masters are, at best, of questionable accuracy.

In his easy-to-read book *Legendary Masters of Martial Arts*, Augustus John Roe digs into the stories of twelve legendary martial arts masters, then analyzes and discusses the truth and fiction behind each. But aside from simply assessing the historical likelihood of the stories, he also compares them to similar legends, finding parallels and similarities, and discusses possible explanations for why and how the distortions or false reports might have arisen, why people repeated them, and the meaning and motivations behind the distortions and retellings.

The stories and analyses are laid out logically and sensibly. First, Roe introduces the historical character, then the popular legend, then the historical facts of the legend (as best as he can determine), and then the functions and purpose of the legend. These analyses tend to be short and superficial and, at times, frustrating in their lack of depth. On the other hand, having attempted to work with similar sources to answer similar questions, I know often there just isn't a lot of detail available, so I greatly respect what he's done. To make things even more challenging, often these historical figures have entered popular culture and become heroes in comics, novels, films, and shows in their home countries. Like Billy the Kid or Robin Hood, they are often real historical persons whose film and literary escapades have completely distorted their actual life in the eyes of the public.



Legendary Masters of the Martial Arts: Unraveling Fact from Fiction. By Augustus John Roe. YMAA Publication Center, 2023.

Some of the twelve figures covered in this book are well known. For instance, Bodhidharma is the legendary person who brought Buddhism to much of Asia and was said to have had a role in the foundation of the Shaolin temple. Miyamoto Musashi is the famous samurai and author of *The Book of Five Rings*, a globally popular martial arts and swordsmanship text. For pop culture icon Bruce Lee, rather than focus on his entire life, Roe focuses on one controversial—and often fictionalized—story: a challenge fight in San Francisco allegedly fought over Lee's decision to teach Chinese martial arts to people who weren't Chinese.

Others are well known only in martial arts circles. Morihei Ueshiba is the founder of Aikido, and Masutatsu (Mas) Oyama is the founder of Kyokushin Karate and author of classic martial arts books. With these figures, Roe focuses on reports of amazing, superhuman feats they allegedly performed. Ueshiba is often credited with using his chi and mystical awareness to survive gunfire and an execution attempt in Manchuria in the 1930s, while Oyama allegedly karate chopped the horns off enraged bulls to demonstrate his power. Roe analyzes the historical context and the way they were retold, and he offers more rational explanations. For instance, with Oyama, Roe examines these matches with bulls carefully, points out the lack of films, and mentions reports from Oyama's own students that he allegedly sawed cuts in the bulls' horns ahead of time, making the horns easier to break.

Others are lesser known even among those familiar with the general subject. Bui Thi Xuan, a Vietnamese national heroine, martial artist, and patriotic rebel, and Thai kickboxer Nai Khanom Tom both lived in the eighteenth century. Their lives were poorly documented, and their fame and importance have grown in their home countries since death. There are even shrines in temples to Bui in Vietnam. The book describes how their lives and actions were reinterpreted, recast, and spread even further, as well as the likely truth of their legendary martial arts accomplishments.

In conclusion, although this book is at times superficial and cursory, it is likely the best on the subject. The author dug through facts, myths, legends, and pop culture media claims to provide an interesting and solid assessment of many controversial aspects of Asian martial arts history. Skeptics should find the analyses of how and why these sensational distortions enter the historical narrative of interest. ■

Peter Huston is a longtime contributor to Skeptical Inquirer and author of several books, some dealing with skepticism and strange claims. For this review, he drew on his background in martial arts, over six years living in East Asia, and a master's degree in East Asian Studies from Cornell University.

Lessons from the History of Spiritualism

Michelle E. Ainsworth

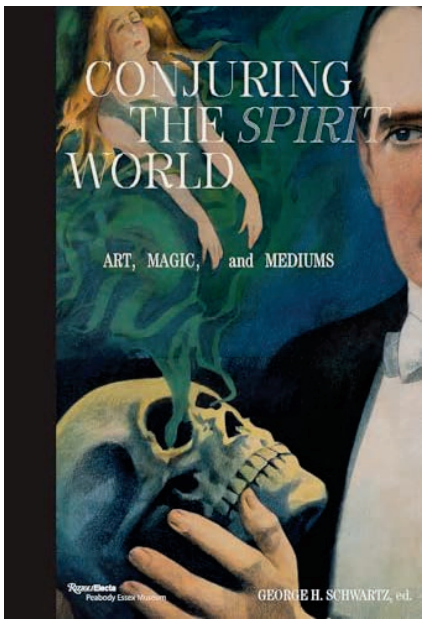
Could séance mediums contact the dead more than a century ago? How did their manifestations change or get challenged? What cultural currents did these draw on? What lessons can be learned? These are among the questions insightfully explored in *Conjuring the Spirit World: Art, Magic, and Mediums* edited by George H. Schwartz, PhD. Schwartz is the curator of the museum exhibition that inspired it, which debuted at the Peabody Essex Museum in Massachusetts in September 2024.

Spiritualism here refers to the gathering of people in a group for the purpose of contacting the dead through one person, called a medium, a movement that originated in the United States in 1848. The (corporeal) body of the book is divided into unnumbered essays by seven contributors, including a neuroscience researcher, an anthropologist, and several museum curators. The book includes endnotes and an index.

Contemporaries and historians have both seen Spiritualism as a religion that offered scientific proof of life after death, thus reconciling competing worldviews. However, this book gives that idea a new clarity by framing Spiritualism around the evolution of the objects that provided the evidence, including mysterious writing, floating trumpets, and ghostly photos.

Science and technology were a leitmotif of the movement. The popular image of the Spiritualist séance—people around a table—originally had a theoretical basis. Men and women were alternated to represent the conductivity of two metals. Many people likened a séance medium's connection to the dead to the then-new technology of the telegraph and later the radio. The book includes illustrations of both the objects "manifested" by mediums (from writing to effervescent cloth to even paintings) and of devices used to test mediums, some devised by leading scientists.

To prove that the phenomena were produced by ghosts, the medium was often



Conjuring the Spirit World: Art, Magic, and Mediums. Edited by George H. Schwartz. Peabody Essex Museum, 2024.

restrained. To allow séances in full light, the medium was sometimes concealed in an enclosure made of cloth or, starting in 1855, of wood. Schwartz credits the latter to a windowless cabin built for that purpose by the Koons family in Ohio. Another essayist discusses the more well-known theory that the cabinet evolved from the portable armoire used in the tours of the early stage-mediums The Davenport Brothers. In any case, lecture hall mediums shifted the focus of the séance from communication with a dead relative of a séance attendee to the public demonstration of phenomena by unnamed ghosts. The increasingly common shift from homes to halls and progressively dramatic phenomena eventually fractured the movement.

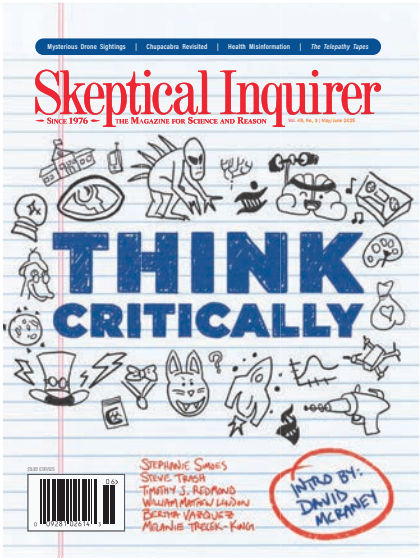
Taking the next step from the branch of Spiritualism—which evolved into something bordering entertainment—magicians added magic tricks mimicking Spiritualist phenomena to their acts. One of England's leading magicians of the nineteenth century, John Nevil Maskelyne, jumpstarted his career by reproducing the cabinet effect, with critical commentary, and séance-inspired magic tricks became readily available by 1876 (and performed in magic shows ever since, usually without the commentary). An exception was Harry Houdini, who grabbed headlines by denouncing mediums on and off stage in the early 1920s, including in association with *Scientific American* magazine.

Two of the book's chapters explore spirit photography (ghosts appearing in portraits with a person who sat for a photo), as well as its antecedents, especially the practice of wearing mourning portraits in a locket and of popular magic lantern ghost shows. More fanciful Spiritualist-inspired imagery was soon integrated into magicians advertising, and later the horrors of World War I (which revived Spiritualism's popularity) were an influence on Spiritualist art.

What lessons can be drawn from the history of the Spiritualist movement? One answer is provided by a neuroscientist, who asks the perennially relevant question of how people can see the same thing and interpret it so differently. Part of her answer is research suggesting that "most belief-generating neural processing occurs subconsciously." Schwartz concludes the book with a brief discussion of the Ouija board, born of the Spiritualist movement more than a century ago.

The anthology's focus is new, mostly ignoring well-covered topics it might have included, such as overlapping phenomena or movements (e.g., Mesmerism or Theosophy), gender roles, and late twentieth century mediums. But the book's rich imagery can be pedagogically helpful, even before considering how the essays contribute to understanding the movement. ■

Michelle E. Ainsworth holds a master's degree in history. For seven years, she reviewed books on magic history and related topics for *Skeptic* magazine.



Critical Thinking

The May/June 2025 issue was marvelous! First, I have to admit that I pride myself on being a critical thinker. "So," I thought, "what could articles about critical thinking possibly tell me that I don't already know?" Well, I also pride myself on being intellectually humble (honest!). "So," I thought, "there's a lot I *don't* know. Maybe an issue about critical thinking will have valuable lessons after all." And so, I read the issue, cover-to-cover as is my wont with Skeptical Inquirer, and am I glad I did! Critical thinking is important in so many different aspects and situations in life, and sometimes it's too easy to be lulled into a false sense that familiar situations aren't worth getting too critical about. False! Often, that's when most of us (yes, me included) need a refreshing kick in the backside, to start thinking critically and analytically again. And it's refreshing, too, to learn new ways of looking at circumstances that have become so everyday and humdrum that we end up ignoring them completely.

One thing I did miss—maybe I overlooked it?—is a succinct definition of what "critical thinking" actually entails.

Linda Ferrazzara
Randolph, Massachusetts

Editor Stephen Hupp responds:

Thank you for this letter along with your request for a definition of "critical thinking." I reached out to each of the cover story authors, and they all independently responded (without having seen the other authors' definitions first). They are below.

Stephanie Simoes: We all know what "thinking" is, but what turns ordinary thinking into critical thinking? Put simply, critical thinking is careful thinking. We practice it when we slow down to question our assumptions and challenge our intuitive conclusions. By combining careful analysis with intellectual humility and an awareness of our mind's limitations and biases, critical thinking enables us to evaluate evidence rationally and communicate clearly.

Steve Trash: Critical thinking is the practice of asking thoughtful questions and staying skeptical—even of your own assumptions. It recognizes the mental shortcuts we all take and works to move beyond first impressions in pursuit of deeper, more accurate understanding.

Timothy J. Redmond: Critical thinking is the earnest evaluation of sources, claims, and the receivers of claims (including ourselves) to ensure that one's beliefs are logically supported by a large quantity of high quality evidence.

William Matthew London: I didn't refer to "critical thinking" in my article. It is included in the title because the article fits the broader critical thinking theme of that SI issue. It is common in various subject matter disciplines in undergraduate education to offer courses on critical thinking or that emphasize critical thinking. Many textbooks on critical thinking have been published. Linda Ferrazzara inspired me to write about how most undergraduate instruction and textbooks in critical thinking have little to do with promoting rational skepticism. In one of my online *Consumer Health* columns, I quoted five of the most relevant definitions of critical thinking I have found to promoting rational skepticism. See "Health Street Smarts Fairs Created by University Students to Promote Critical Thinking on Campus, Part 2" at skepticalinquirer.org.

Bertha Vazquez: What a great question! Before I started working for the Center for Inquiry and running the Generation Skeptics program, I would have given the standard science teacher response: Critical thinking is the ability to actively and skillfully analyze, evaluate, and synthesize information. Now, I would add that critical thinking also involves self-reflection: the self-awareness necessary to identify and challenge our own biases and limitations. This second component makes the scientific method and its goal of designing experiments to prove ourselves wrong, not right, all the more relevant and important.

Melanie Trecek-King: This is the perfect question! In my experience, nearly everyone seems to think critical thinking is important and that they're a critical thinker, but when asked they struggle to define it. That included me, which is why I addressed the different definitions in "Thinking Critically about Critical Thinking" (SI, November/December 2024). The short version is that, in educational settings, critical thinking is often defined as problem-solving within specific domains. However, while this is an important educational goal, it requires deep knowledge of the topic. That's why my preferred definition is more akin to good thinking, as it's applicable across various domains. It includes being aware of our limitations and biases, reflecting on our thought processes, embracing nuance and uncertainty, seeking objectivity, being willing to change our minds with evidence, and detaching our beliefs from our identity. The shortest definition of critical thinking, in my view, is being curious, being skeptical, and being intellectually humble. Good thinking is our shield against deception—especially self-deception.

Müller-Lyer Illusion

Regarding Stephanie Simoes article in the May/June 2025 issue of SI, I'm puzzled by the opening line: "Optical illusions, such as the famous Müller-Lyer illusion depicting two lines of equal length (shown at the top of the Critikid logo box to the right …)." The lines are not of equal length. I don't understand why you didn't think to measure them before making the claim.

Hilel Stolzberg
Inglewood, California

Editor Stephen Hupp responds:

Given that I'm the one who decided to put that specific depiction of the Müller-Lyer illusion in the Critikid logo box, I have to admit that my heart skipped when I read Hilel Stolzberg's letter, and dread set in even as I looked at the image again. "Oh no," I fretted, "I somehow chose a bad version of the illusion!" Just to make sure, though, I quickly measured the two lines, and to my relief they actually are the same size. The illusion is so strong that it happens even when you (and I) are reading (and writing) about it! We'll reprint the image here, along with some additional lines to help reveal that it really is an illusion.

JFK Correction

As someone who can remember the John F. Kennedy assassination, I was interested in Timothy J. Redmond's mention of the film *JFK* (SI, May/June 2025), about which I strongly agree with him. But note that *Case Closed* is by Gerald Posner, not Richard.

Ray Ward
London, England

Cancer Misinformation

I enjoyed the May/June 2025 issue of Skeptical Inquirer and, especially, as I am a retired oncologist, Andrea Love's article, "Cancer Misinformation Kills; Chemotherapy Saves Lives." The article recalled to me a patient, a woman in her early thirties with three children, who presented (sometime in the mid-2000s) with metastatic triple-negative breast cancer. I informed her of her diagnosis and that she would need chemotherapy to control the cancer. I began her on a regimen of single agent gemcitabine given every three weeks, which reduced her cancer with only mild toxicity. However, after several months, she asked how long she would be taking gemcitabine, and I answered that I hoped it would be a long time because she was tolerating it so well. She then asked for her prognosis, which I generally did not provide unless a patient asked or there seemed to be important life decisions to be made. I informed her that the median survival of a woman with metastatic triple-negative breast cancer was two years but that meant that half the women were still doing well beyond two years. She became pensive, asked no further questions, and proceeded to her treatment that day in late August. She did not return for her scheduled treatment three weeks later. Phone calls to her home went unanswered.

A few days before Christmas she was taken to a hospital where I practiced in Georgia. She was moribund and beyond anything I could do for her. She died a day or two later. She should have lived another two years or more but had succumbed to the promises of a natural medicine clinic in California. There are other such anecdotes, but that one always particularly saddens me.

Kenneth Deaton, MD
Macon, Georgia

Chupacabra Hypnagogia

Benjamin Radford gives an excellent recap of Madelyne Tolentino's stories about the original sighting of the chupacabra (SI May/June 2025). It is in her 2010 interview that we have a clue of what was really happening. Without an account from Tolentino's mother, we are left to speculate. And while we can't discount that this is just a hoax on her part, there is another explanation. From the article: "Tolentino told me only she and her mother saw the creature. *Tolentino was sleeping*, and her mother woke her shouting that she had seen some strange animal outside" (p. 54, emphasis added). This sounds like she was having hypnagogia or a "waking dream" with the movie *Species* having a direct effect.

Brad Marshall
New York, New York

Parental Alienation

SI has a regular column called New and Notable Books. In the May/June 2025 issue, Jean Mercer's book, *Someone Said Parental Alienation*, was featured on that page. In the succinct description of the book, four distinct factual errors appeared in the following sentence: "Jean Mercer skewers parental alienation, 'a legal concept without validated psychological definition, assuming that children who resist contact with one divorced parent have in many cases been 'brainwashed' or persuaded to do so by the machinations of the preferred parent.'"

"Skewers." This word indicates an outright bias against parental alienation (PA) theory. It conveys that critics of PA theory are good guys and proponents of PA theory are bad guys.

"A legal concept." Of course, PA is primarily a mental health concept, although it is sometimes relevant in legal contexts.

"Without validated psychological definition." The concept and definition of PA have been expressed and examined in hundreds of books and articles in peer-reviewed journals.

"Assuming that children who resist contact [have been] 'brainwashed.'" That is a widely cited example of PA misinformation, i.e., the false idea that proponents of PA theory "assume" that children who manifest contact refusal were indoctrinated by the favored parent. No such "assumption" exists in PA literature.

This misinformation regarding Mercer's book is a serious problem that needs to be corrected. It does not suit an organization that takes pride in promoting scientific inquiry and scholarly integrity. The solutions: print an apology and a retraction of that paragraph; delete that paragraph from the SI website.

William Bernet, MD
Professor Emeritus
Vanderbilt University School of Medicine

Alan D. Blotcky, PhD
Clinical Associate Professor
University of Alabama at Birmingham

Editor Stephen Hupp responds:

All good theories—and a lot of bad ones too—can benefit from some time on a skewer. My biggest concern with parental alienation theory is the limited evidence—and potential harm—associated with some of the programs that target reunification (see Bernet and Blotcky's response to Jean Mercer's original article and Mercer's response earlier in this issue on pp. 13–14, as well as my chapter in Mercer's other related book Challenging Parental Alienation*). Here's some related points: a) there's no doubt that some parents encourage their children to avoid the other parent, and there are certainly times when this is done unfairly; b) the term* parental alienation *is commonly used in legal settings, and the term* parental alienation syndrome *is particularly dubious because it is not an officially recognized "syndrome," and c) it's not hard to find proponents of parental alienation theory who use the term* brainwashed*, and it's likely (in my opinion) that some divorce attorneys are too quick to embrace that idea as well. I do not believe that the description of Mercer's book in our New and Notable Book section warrants an apology or a retraction, but I do welcome Bernet and Blotcky's thoughts. I similarly encourage them to welcome critiques with the goal of improving the systems involved in making decisions related to reunification. We all have the shared desire to protect parents falsely accused of parental alienation, to protect parents who have been otherwise unfairly maligned, and especially to promote children's healthy relationships while also protecting their safety during a difficult time in their lives.*

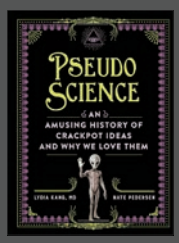
Send in a Letter to the Editor

Letters to the Editor are for views on matters raised in recent issues. Letters should be no more than 225 words. Due to high volume, not all letters can be published, and those selected may be edited for space and clarity. Authors criticized may be given the opportunity to respond. Submit Letters to the Editor by email text (not attachment) to letters@skepticalinquirer.org. In the subject line, write "Letter to the Editor." Include your name and location (City, State).

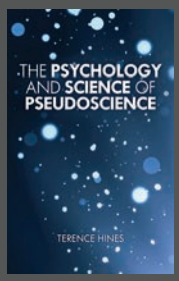
[NEW AND NOTABLE BOOKS

Edited by Stephen Hupp. Listing does not preclude future review.

ALIEN EARTHS: The New Science of Planet Hunting in the Cosmos. Astrophysicist Lisa Kaltenegger is the founding director of the Carl Sagan Institute. Neil deGrasse Tyson says, "Kaltenegger's breezy narrative style invites you to experience with her the challenges and joys of being a scientist on the frontier of discovery." St. Martin's Press, 2024.



PSEUDOSCIENCE: An Amusing History of Crackpot Ideas and Why We Love Them. Physician Lydia Kang and historian Nate Pedersen provide "a light-hearted look into why we insist on believing in things such as Bigfoot, astrology, and the existence of aliens." Other topics include rumpology and spontaneous human combustion. Workman Publishing Company, 2025.



THE PSYCHOLOGY AND SCIENCE OF PSEUDOSCIENCE. In a blurb for this book, SI Editor Stephen Hupp wrote, "Terence Hines is one of the world's foremost authorities on the science of pseudoscience. He's also a hero of mine … I learned so much from this book, and I believe all readers will benefit from thinking about what's believable (and what's unbelievable) using key principles of cognitive psychology." Rowman & Littlefield, 2025.

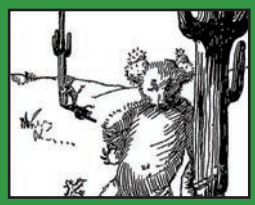
SPOOKY SCIENCE: Dissecting the Mysteries of Ghosts, Cryptids, Aliens, and Other Oddities. Geologist Meagan Ankney and chemist Paige Miller transform their podcast—Spooky Science Sisters—into a skeptical book exploring "the science behind mysteries like ghostly apparitions, legendary cryptids, and spine-chilling haunted places." Wellfleet Press, 2025.

Podcast Pairing

SECRETS REVEALED

Fake Out Answer

Two of the animals are fake:



The cactus cat is one of the legendary "fearsome critters" animals invented by lumberjacks around the turn of the twentieth century. The photo depicted a real bobcat.

The vegetable lamb was once thought to be a "zoophyte," an animal blended with a plant. Skeptics began refuting zoophytes in the seventeenth century (see Massimo Polidoro's column "The Mystery of the Vegetable Lamb" in the March/April 2024 issue of SI). The photo depicted a real baby sheep.

Silly Sorting Answer

The first four books were written by Dr. Seuss and the last three books were written by Stephen Jay Gould.

Word Noodle Answer

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